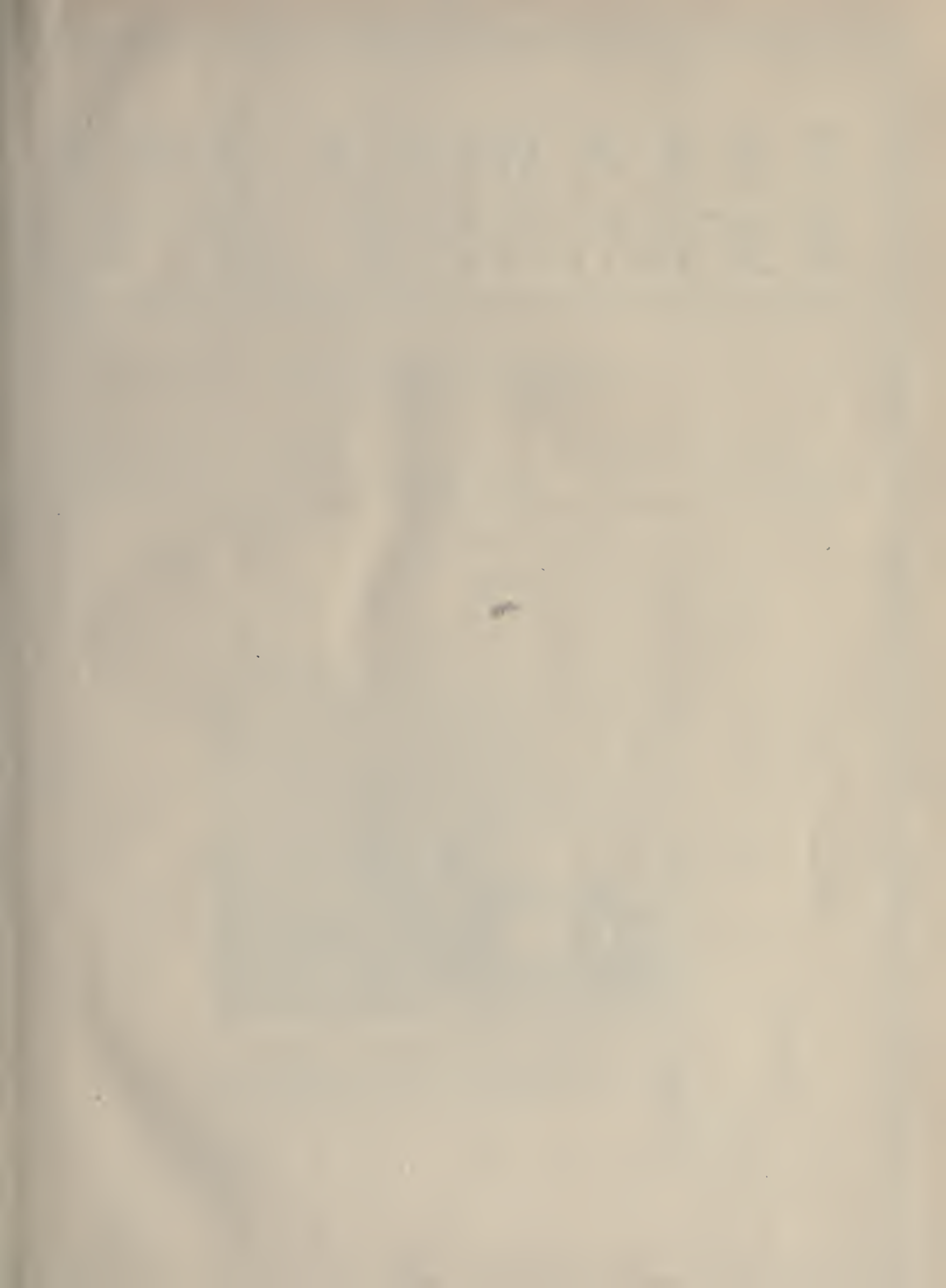




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VOL. XXX, No. 1

OCTOBER, 1921

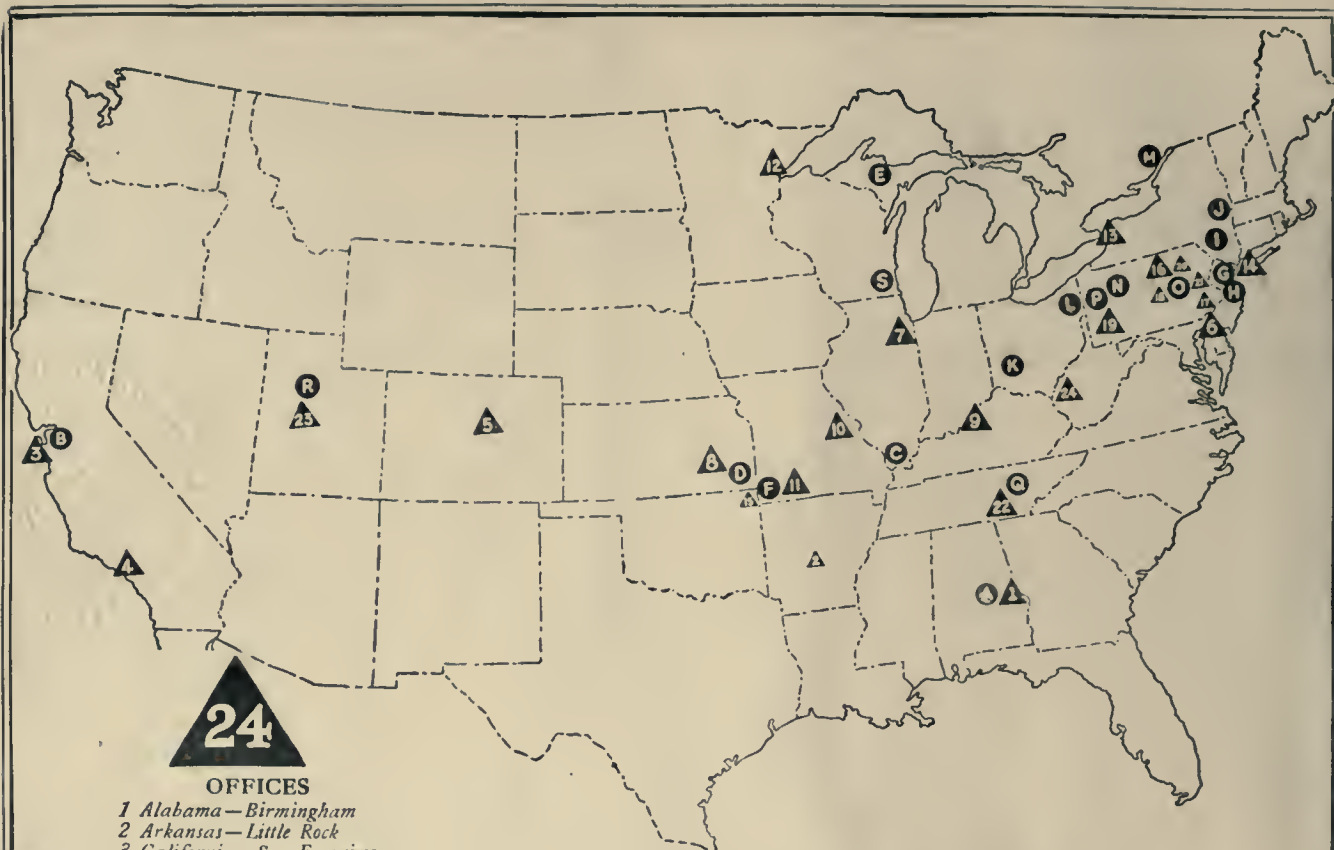
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Several embryonic surveyors preparing to leave camp for a day's work in the field, with the instrument tent in the back-ground. This photograph was taken at the annual summer survey camp of the past summer, held this year near King's Ferry, by Prof. Underwood, who was in charge of the camp.

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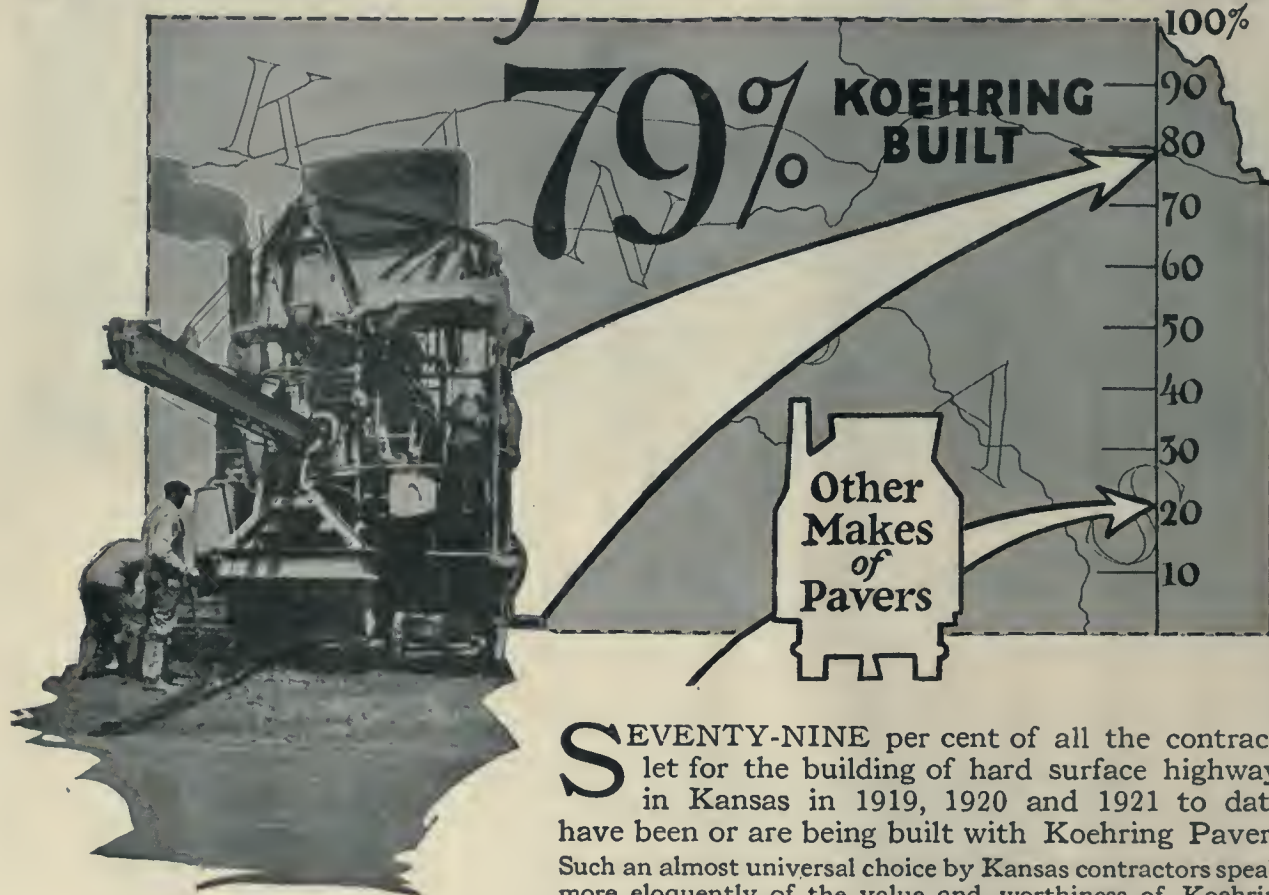
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Total number miles of brick road let to date in Kansas.....	60.043
Total mileage of hard surfaced roads let.....	241.392
Mileage paved or being paved with Koehring machines.....	191.309
Mileage paved or being paved with all other machines.....	50.083
Percentage of Koehring paved roads.....	79.249
Percentage of roads paved with all other machines....	20.752

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THE CORNELL CIVIL ENGINEER

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Vol. XXX

OCTOBER, 1921

No. 1

EDITORIALS

PUBLIC OFFICE AND THE ENGINEER

As the years roll on new and greater fields of occupation open up to the man with a technical training or education and his already-existing tasks become of greater importance to his fellow man. Of late years especially the technical man has been called upon more and more to fill positions which are almost strictly non-technical. One of the greatest of these new fields which is thus opening up to the engineer or technically trained man is that of public office (commonly called "politics"). This field is perhaps the most important new field from the standpoint of the public. Up until the last few years (and in some instances, even today) the lawyer and the petty politician have held a monopoly on public office. Why, nobody seems to know. In some public offices, legislative especially, a lawyer is practically the only one who can "fill the bill" effectively.

Surely the training of the engineer should permit him to judge the necessities of the people as accurately if not more accurately than the lawyer. We admit that it is necessary for a lawyer to pass upon the constitutionality of most bills before they become laws. But this is hardly enough proof of the fact that lawyers and petty politicians ought to occupy all public offices. That they do to-day to such a great extent, is more of a slur upon the intelligence and common sense of the American people than it is a benefit to the government concerned. It is high time now that the people began to wake up to the absurdity of the whole system of politics as it exists to-day. How long is the public going to stand for such apparent anomalies as having a drug clerk for town engineer and a trucking contractor for a sewers and water commissioner? The reader may consider this statement as supposed humor, but the seriousness of it must be realized when we state that these were the actual condition which existed in a small Jersey town and in a medium-sized Connecticut city, respectively. However, the ray of hope in the whole situation is, that we—both the public and the engineer—are beginning to wake up to the situation—slowly, it is true, but nevertheless, awakening. How long a complete awakening will take however depends largely on the engineer.

It is a very good sign indeed that the technical men—engineers and scientists—are taking some little interest in politics. The technical man must become the leader in the crusade against a political system which is unjust to himself. He must train the public not to tolerate anybody but an engineer as a candidate for such public offices as sewer, water, streets, highways, plants, bridges, and public service commissioners, city, town or county engineers or surveyors, and those numerous other public offices requiring the services of a technical or semi-technical man in order that the duties pertaining to the office may be discharged in the most efficient and economical way.

A start has been made. Engineers and technical men are at last beginning to realize that they have put up long enough with the insult of politics upon their profession and are at last beginning to awake and what is more important to assert themselves. The four major engineering societies, the recently organized Federated American Engineering Societies and the American Association of Engineers have started and are still doing some good work upon the realization that the engineer has an important civic duty to fulfill. How it happened that this realization of the engineer's civic responsibility has not come sooner—years and years sooner—we cannot say. It may be that it took some little time for the public to learn that a politician as a commissioner of streets could not make as good technical decisions and could not save the town or city treasury as much money as a highway engineer. But the reason or reasons which caused the awakening are of secondary importance. Of prime importance is the fact that the awakening has occurred and is bound to produce results satisfactory to the engineering profession and to the public. For a proof of the public's awakening to the merits of an engineer as a holder of public office witness Mr. Herbert Hoover, a Mining Engineer, now Secretary of Commerce in Mr. Harding's cabinet, Mr. James Hartness, a Civil Engineer elected Governor of Vermont in the last elections, a city like Memphis, Tennessee, boasting of having engineers for two of its five city commissioners or councilmen and six other engineers in important city offices, and a small town like Miami Beach, Florida,

which has a population of only about 525 yet boasting of having engineers for two of its seven city councilmen and three other engineers occupying responsible city offices. But there is still much to be done. The ranks of the engineers occupying high national or state public offices must increase. The number of cities that can qualify as recognizing engineers must also increase.

The rank and file of the profession must be continually on the jump to press this all-important matter and at all places where the question of future officials comes up "put in their paddle" for proper representation on the slate. It must be remembered that a start only has been made, even though it has been a bold enough start to make the old school of office seekers and office holders take care.

The time for congratulating the engineer has not arrived. His efforts toward making the voters see that an engineer is the logical candidate for certain public offices must be re-doubled if he is to look upon these offices as belonging to his profession.

Alumni Co-operation.

Alumni co-operation is a factor upon which every college magazine of the type of THE CORNELL CIVIL ENGINEER must rely if it desires to be a successful publication. There are moreover several reasons why it is only natural that a magazine of this type should receive this support. In the first place such a magazine is a publication of at least as much interest to the alumni as to the students, possibly more so. The technical articles appearing in this type of magazine are written almost exclusively by the alumni of the school. In this way the alumni can find out what other alumni are doing and how they are doing it. Through the alumni columns they find out the changes of occupation and address of other alumni sooner and more accurately than through any other medium. These are the benefits derived by the alumni.

The benefits derived by the magazine are the answers to the question of "Where does the money come from?" We must look to the advertising department each year for the money to take care of the greater part of our expenses. This year our expenses will be about equal to those of last year, when they were double what they have ever been before. This is precisely where we find our greatest trouble. Without the co-operation of our alumni we cannot get advertisements which will bring results to ourselves and to our advertisers. We realize that the majority of our subscribers trade with many of the firms that advertise with us. But we also realize that these subscribers do not mention us nor the fact

that they saw the seller's advertisement in our journal so that the seller does not realize that the market was created, at least partially, with our aid. That is the reason we ask more fervently than in the past "Please mention the CORNELL CIVIL ENGINEER" when dealing with its advertisers. In these hard times and periods of depression and consequent periods of curtailment of advertising those magazines which do not or which appear not to give a reasonable return on the advertising are the ones that are dropped first. We need the advertising to meet expenses. Therefore when dealing with our advertisers "Please mention the CORNELL CIVIL ENGINEER."

To those of our supporters who are Consulting Engineers we offer Professional Card Space at very reasonable rates. In the past advertisement of any sort by a consulting engineer was considered distinctly unprofessional, but advertising is now becoming to be considered quite proper even as with doctors and other professional men. Card space offers a conservative yet effective way of placing one's name before prospective consultants. Use it.

The remainder of our income is derived from subscriptions, students and alumni. This item apparently a small one in financial comparison with the advertising item is in reality a very important factor since it directly influences the amount of advertising which the advertisers are willing to place with us. In fact it might be said that the advertising varies directly with the length of the subscription list. In view of this fact we urge all those who are subscribers to importune those alumni who are not subscribers to "climb aboard the wagon" and read each month the latest news of fellow alumni, what is happening around the Hill, and interesting semi-technical or technical articles on the newer things in engineering.

With the combination of the Engineering Colleges the C. E. group becomes but a group in a large organization rather than an individual organization, within the University. Just what the effect of this reorganization will be we are of course unable to prophesy as yet. Neither are we able to state what the effect of this reorganization will have upon the Civil Engineering activities. We hope and it is our earnest desire, however, to have the 100% support of our alumni to set before the incoming C. E. men as a shining example. We are doing our best. Will you help?

THE NEW HONOR SYSTEM

So far this year little has been heard either of the University Honor System or of the lack of it. But no news is good news, and it is significant that this fall there is no repetition of the tales of fraudulent examinations at the end of the year before, such as swept the Campus last fall. Public Opinion is a strong deterrent to evil-doers.

PLACING CONCRETE UNDER NOVEL CONDITIONS

By GEORGE MURGATROYD
*Section Engineer, Transit Construction Commission,
New York City*

Plant Equipment and Layout, Sequence of Placing, and Method of Placing in Freezing Weather

The problem of placing the concrete in the construction of a section of the Fourth Avenue Subway Line of the New York Municipal Railway Corporation in Brooklyn was solved by a novel method, hereinafter described in detail. Due to the fact that the work was essentially in an open cut, although in the center of a busy city street this new method of depositing concrete in subway construction had to be resorted to. The contractor's method however, while novel, proved so successful that the work on the particular section under discussion was completed a year or more in advance of the adjacent contracts.

General Scheme

The contractor, having completed the bulk of the excavation by means of a steam shovel, obtained a well laid three foot gauge railway running from end to end of the contract, together with five or six Brownhoist locomotive cranes. With this equipment on hand the advantages of establishing the concrete mixing plant at or near the physical center of the contract become apparent at once. The materials used in making the concrete were hauled in side-dump cars over a narrow gauge track by 20-ton dinkies from lighters or piers that docked at the foot of 19th Street, five blocks away from the mixing plant. The mixed concrete was hauled from the mixing plant in cars of either one or two cubic yard capacity over a narrow gauge track by 20-ton dinkies to the place of deposition, where the cars were picked up by the locomotive cranes and emptied into the forms. The speed and efficiency with which the concrete was placed were due, in the main, to the flexibility of the construction unit—the flexibility resulting from all the equipment, except the mixing plant itself, being on wheels, and therefore easily movable from point to point as required.

Mixing Plant.

The mixing plant was established between 18th and 19th streets about one block below the physical center of the contract. It was constructed by excavating the west half of the block between 18th and 19th Sts. to sub-grade and using the west sheeting as the west wall of the plant. Two large bins were then constructed adjacent to each other and having a wooden floor of about four feet above sub-grade. The north bin had a capacity for 1000 cu. yd. of sand and the south bin for 2000 cu. yd. of gravel. Midway between and to the east of these two bins, a weathertight

shed extending about twenty feet above the street surface, was erected; the upper portion of which consisted of two bins of 50 and 100 cubic yards capacity, respectively, for sand and gravel. A large water tank was also constructed in the upper portion of this shed.

The street level floor was used for storing cement for the immediate use of the mixer and on the street level were also located the measuring hoppers of a Ransome concrete mixer of one cubic yard capacity, electrically operated. The small elevated bins containing the sand and gravel for the immediate use of the mixer were filled from the large bins under the street level floor by means of a bucket conveyor which elevated the sand and gravel into the smaller bins above. The bucket conveyors were filled at the bottom of the large bins by means of a "V" horizontal belt which ran under the large bins and which the material in the large bins dropped through sliding trapdoors in the floor of the bins. The bucket conveyor discharged in the small bins above, and they in turn discharged to the measuring hoppers of the mixer by means of gravity. The only fault developed by this plant was that the bucket conveyor capacity was not quite equal to the capacity of the mixer, so that after about a three hour run the mixer had to be stopped for about fifteen minutes while the upper bins were filled by the bucket conveyor.

The concrete was mixed in the proportions of 1—2½—4½, rather wet, about 20 per cent, by volume, of water being added.

Method of Conveying

In placing the wall footings and track slabs the concrete was carried in a special body made to fit on the body of a four cubic yard side-dump car, which was simply a box cut in half by a sloping bottom which extended from the top at the one side to the bottom at the other side. The inside was lined with sheet iron and provided with a gate on the low side so that the contents would be discharged by gravity. This device with the use of metal chutes, made the placing of wall footings and track slabs an easy matter. In placing the duct bench and lower portion of the side wall the concrete was discharged from the mixer into a one cubic yard bucket, two buckets being placed on a flat car and four cars constituting a train. At the forms the buckets were hoisted and dumped by a locomotive crane into a movable chute about twelve feet high and resting on a single bent

at the outer end, braced back to the form.

For the roof, the interior walls and the upper portion of the side walls, the concrete was discharged from the mixer into a two cubic yard bottom-dump bucket, one bucket to a flat car and four cars to a train which was hauled to the forms by a 20-ton dinkey. There it was picked up and dumped by a locomotive crane. At the most distant point of the work the time consumed from the mixer to the forms did not exceed fifteen minutes. This swift and smooth passage from the mixer insured a well mixed concrete perfectly free from any trace of initial set when it arrived at the forms.

way) the question at once arose as to the minimum time the forms must remain in place. The roof consisted of a reinforced concrete slab with about a fourteen foot span so it was necessary that the concrete be thoroughly set before the forms were moved. By trying the concrete on top with a pick and on the end after removing the bulkhead, it was possible to determine when it was safe to remove the forms. A minimum time of sixty hours was fixed for the summer months and an increasingly longer time as the day's became colder and colder during the winter months.

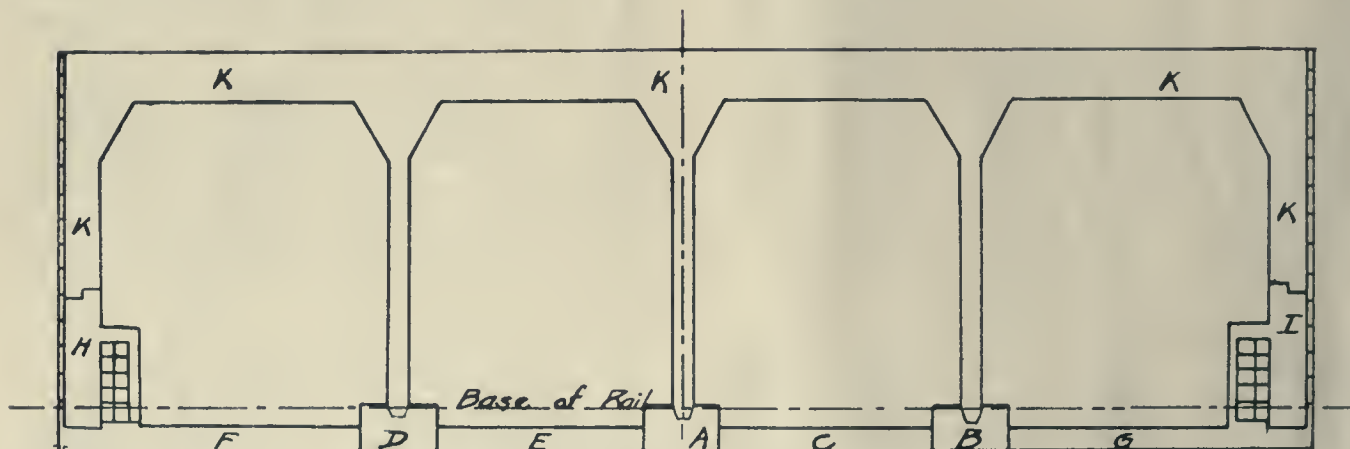


FIG. 1. Sequence of Operations in the Placing of the Concrete.

Forms.

The forms used for the subway above the wall footings and duet bench, were of steel made by one of the leading manufactures of this type of product. They were collapsible, operated on a track and were in units five feet long. Usually, eight of these units were joined making a unit forty feet long which when collapsed was pulled forward by one of the dinkeys. About six inches of the form was left inside and the point between this and the form was caulked with oakum, making a perfectly tight form. While some honeycombed spots appeared in the walls they were not due to the seepage of grout but to the difficulty of spading the face of the wall which was twelve inches thick and contained two rows of one inch square rods spaced ten inches center to center and two rows of five-eighth inch square longitudinal rods spaced eighteen inches center to center, which together with the spacers and the transverse ties between the vertical rods, made it very difficult to work the concrete against the face of the form. The transverse roof rods were supported on steel chairs resting on the roof and fastened to the longitudinal rods, while their ends were wired to the vertical rods in the walls, making a very stiff cage which it was practically impossible to displace.

As the contractor had only a limited amount of the steel forms (eighty linear feet of four-track sub-

Method Of Placing.

The original idea in connection with the installation of the central mixing plant, was to place the concrete by means of compressed air. Accordingly, three Ingersoll-Rand compressors driven by three 75-horse power General Electric motors were installed together with the usual storage tank. An ejector was placed under the mixer to receive the charge therefrom by gravity. The concrete chamber was then sealed up, the agitator started, air admitted to the concrete chamber, finally discharging the batch through a six-inch orifice reducing to a four-inch wrought iron pipe which was about three hundred feet long. The pipe discharged into a cylindrical casting with a number of vanes inside so that the concrete was discharged quietly through an opening in the bottom of this casting into the form below. The manufacturer experimented for about a month with this device using concrete of varying consistency and with air pressures varying between sixty and one hundred pounds per square inch. By this time, the contractor had decided the scheme impracticable and abandoned it.

The method of placing the concrete into the roof, interior walls and upper portion of side walls forms which was finally adopted involved the dumping of the buckets by the locomotive cranes into a wooden hopper which extended about twelve feet above the roof of the finished subway. A long wooden chute

(Continued on Page VIII)

THE OXYGEN CONSUMED TEST

A Difficulty and Its Remedy

By JOHN SCACCIAFERRO, C. E. '21

The Results of a Series of Experiments Carried on Last Year in the Sanitary Laboratory by the Author under the Direction of Professor Walker

The Oxygen Consumed Test, as an indicator of the amount of carbonaceous organic matter present in water, sewage, or trade wastes, has, in some form or other, been in use since about 1850. The procedure generally followed at the present time in America is that recommended by the "Committee on Standard Methods for the Examination of Water and Sewage" of the American Public Health Association. The procedure reads:

"Place in a flask 100 cc. of the water, or if the water is of high organic content, a smaller portion diluted to 100 cc. Add 10 cc. of sulphuric acid solution and 10 cc. of standard potassium permanganate and digest the liquid exactly 30 minutes in a bath of boiling water the level of which is kept above the level of the contents of the flask. If the quantity of permanganate is insufficient for complete oxidation, repeat the digestion with a larger quantity; at least 5 cc. excess of the standard permanganate solution should be present when the ammonium oxalate solution is added. Remove the flask, add 10 cc. of the ammonium oxalate solution, and titrate with the standard permanganate until a faint but distinct pink is obtained. If 100 cc. of water is used, the number of cubic centimeters of potassium permanganate in excess of the number of cubic centimeters of ammonium oxalate solution is equal to parts per million of oxygen consumed."

Most sewages and trade wastes contain too great an amount of organic matter to be tested full strength. Recommended practice in such case is to dilute the waste and to take 100 cc. of the dilution for the test.

If the amount of oxygen consumed by the dilution, after being corrected for the amount of oxygen consumed by the diluting water and multiplied by the proper concentration factor, is equal to the value of oxygen consumed which would have been obtained had the test been performed with the concentrated waste, such a procedure is permissible. That such is the case was doubted, because of certain results obtained by the Department of Sanitary Chemistry of Cornell University during the summer of 1920, and in November, 1920, the writer, at the suggestion and under the direction of Professor C. L. Walker, began a series of experiments to determine what relation there was, if any, between the degree of concentration and the results obtained.

The wastes used for these experiments were raw Ithaca sewage, Ithaca sewage after septic treatment, cheddar cheese whey, and milk wastes both raw and after various methods of treatment, these milk

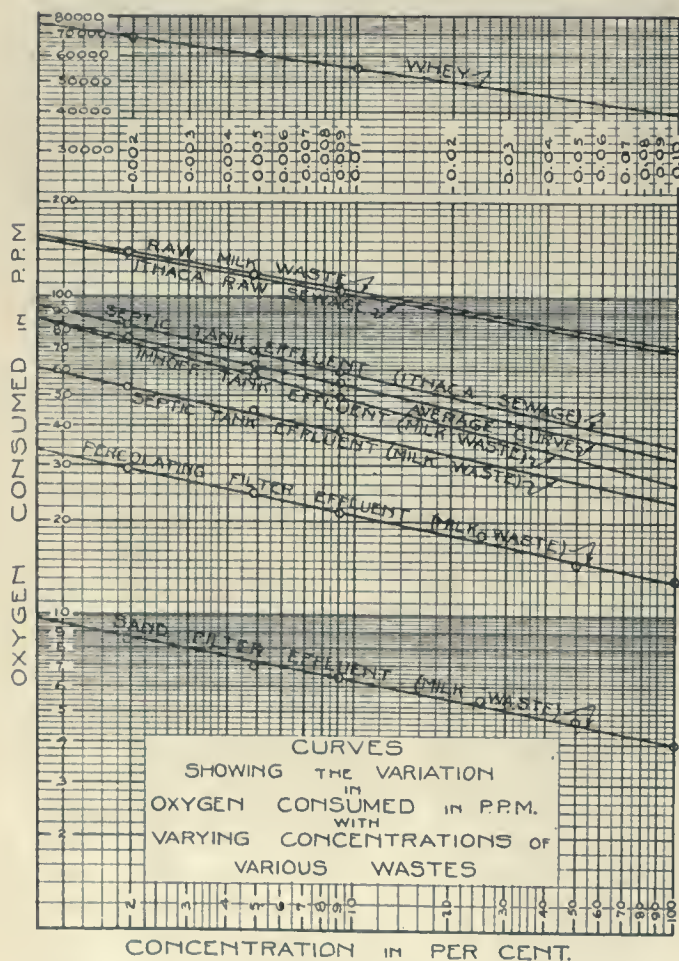
wastes consisting of milk can and bottle washings. Generally six series of tests per month were made with each waste, some of the wastes being tested for a period of three months and others for four.

In making the tests, standard solutions of the reagents were used except for the tests on the whey, where reagents of ten times the standard strength were used, and for dilution purposes distilled water was used throughout. The distilled water had an oxygen demand and its value was found before each series of tests, by making a blank test. With this water the several dilutions of the waste to be tested were made and following the procedure recommended by the American Public Health Association, the oxygen consumed value of each mixture obtained. From these values the amount of oxygen consumed by the distilled diluting water was subtracted and the result multiplied by the proper concentration factor. For the raw wastes and the tank effluents the concentrations used were 1.96%, 4.76% and 9.09%. For the filter effluents, for most of the series the concentrations were 25%, 50% and full strength; 1.96%, 4.76% and 9.09% concentrations were also made in some of the series. The tests of whey were made with concentrations of 0.002%, 0.005% and 0.01%.

The monthly averages of the values obtained, reduced to 100% concentration, are given in Table I, and the averages for each waste are shown plotted on logarithmic paper. Tables II—VI give the results of each test reduced to 100% concentration.

From the results it can be seen that the weaker the concentration, the higher is the value of oxygen consumed when reduced to the basis of 100 cc. This result was obtained for all the wastes tested, from the sand filter effluent with a value of a few parts per million to whey with a value high in the thousands. These results suggest that the oxygen consumed test is untrustworthy as a basis of comparison where the same degree of concentration is used. Not only does it make comparison of results between different laboratories difficult, but it also leads to erroneous conclusions regarding values obtained in the same laboratory. For instance, at a treatment plant it is desired to determine the efficiency of a unit. This is often done by a comparison of the oxygen consumed values of the influent and effluent. Assume that the unit whose efficiency is desired is a sand filter dosed with septic tank effluent. The sand filter effluent can be tested full strength and the value obtained is let us say, (to assume a value actually

obtained as an average) 3.94 parts per million. The septic tank effluent, however, must be diluted before it can be tested. Assume that the test was performed with a concentration of 5% and the value of oxygen consumed, reduced to 100% concentration, was found to be (giving a value taken from the milk waste septic tank effluent curve), 44 parts per million. On this basis the per cent reduction would be 91. But an examination of the curve plotted for the Septic Tank Effluent (milk waste), will show that had the test been performed at 100% concentration, the amount of oxygen consumed would have been 23 parts per million, and the per cent reduction not 91 but 82.7.



But every cloud has a silver lining. An examination of the curves will show that with but one exception (the Imhoff Tank effluent), all the curves have nearly the same slope and plot as straight lines. This is encouraging for if, out of seven different wastes tested, varying widely in oxygen consuming ability, six exhibit the same general characteristics, then these characteristics may be presumed reasonably common to most wastes whose oxygen consumed value the sanitary engineer desires to obtain. An important factor in reaching this conclusion was the fact that the curves for the filter effluents, where six concentrations were used have the same characteristics as those curves drawn through only three points.

The curves, as plotted on logarithmic paper are straight lines, and therefore, actually are parabolas. The general equation of such a curve is

$$y = mx^n$$

where "n" is either positive or negative, fractional or integral. In this case:

y = value of the oxygen consumed for a concentration "x"

m = the Y-intercept, and

n = the slope = the vertical projection divided by the horizontal projection, obtained by measurement of the vertical and horizontal projections of any part of the line in the same unit.

The values of "n" found were:

Raw Milk Waste.....	—0.148
Septic Tank Effluent (Milk Waste)....	—0.210
Imhoff Tank Effluent (Milk Waste)....	—0.259
Sand Filter Effluent (Milk Waste)....	—0.205
Raw Ithaca Sewage	—0.148
Septic Tank Effluent (Ithaca Sewage)...	—0.218
Whey	—0.145
Average value of "n"	—0.193

The experiments show that the oxygen consumed test, as used at present, gives erroneous results for wastes of high organic content; the true result can however be readily obtained by

1. Making the test with three or four different concentrations of several samples, preferably having a wide range in strength.
2. Plotting the averages of the results obtained on logarithmic paper.
3. Determine the slope of the curve drawn.
4. Determine the amount of oxygen consumed at 100% concentration by the use of the equation $y = mx^n$.

The value of "m" can be obtained by a preliminary use of the equation $y = mx^n$, for this preliminary use "y" being the value of oxygen consumed obtained for a per cent concentration "x" and "n" the slope of the curve as determined under step (3) above. As an illustration:—testing a concentration of 5% the amount of oxygen consumed was found to be, say, 67 parts per million. Then (assuming value of "n" found to be —0.2)

$$67 = m (5)^{-0.2}$$

$$\text{or } 67 = \frac{m}{(5)^{0.2}}, \text{ and solving}$$

$$m = 92.5$$

Then, "m" being known, the amount of oxygen consumed at any desired per cent concentration "x" can be found by again using the equation $y = mx^n$, this time "y" being the unknown.

The conclusions drawn from the experiments are:

1. The amount of oxygen consumed varies with the concentration, being greater for the weaker concentrations.
2. This variation takes place as a parabolic function.
3. By the use of the equation $y = mx^n$, comparable and true values of the amount of oxygen consumed by a 100% concentration can be obtained, in this equation, "y" being

(Continued on Page 14)

REPORT OF THE CHIEF ENGINEER OF THE 1921 SUMMER CAMP

Organization, Work Accomplished, Camp Notes; Annual Camp of the Class of '23

T. TELFER, '23, *Chief Engineer*

The area of land surveyed and mapped by the Class of '23 Summer Survey Camp was located on the East shore of Cayuga Lake about twenty miles north of Ithaca. The total section surveyed was about 5 miles square, fronting on the lake and including the town of Kings Ferry—population 150. The camp site was a portion of a large field along the road leading from the railroad station to Kings Ferry, about a quarter of a mile from the railroad station and about 400 feet above the lake.

The main body of campers left Ithaca on Monday morning, June 13th. The remainder of the group left on the late afternoon train and arrived in camp just in time to miss making camp. However severe camp duty was inflicted upon these unfortunates during which they were subject to the jeers and jibes of the early arrivals.

On Tuesday, beside the general finishing touches to the camp, topography, topographic leveling, and triangulation were started. The work of camp consisted as heretofore of topography, topographic leveling, precise leveling, triangulation, hydrography, baseline measurement, and camp duty. For topography the parties were assigned to plots which ranged in size from half a mile to a mile square. The remaining work was accomplished by the assignment of a group to each kind of special work upon every day possible.

The work of camp was carried out by three groups: first, the two-weeks men, mostly Juniors who were assigned to special work only; second, the three-weeks men, Sophomores who completed their topography only; third, the five-weeks men who completed all their work in the one camp. For topography the parties numbered from four to six men of which number only four were allowed on the plot at one time. The three-weeks parties consisted of four men who were on topography all the time. The Juniors were not organized into parties.

The first week passed quickly in the search for stadia constants. Many were found but the right kind seemed strangely elusive; in fact so much so that several of the parties were already despairing of finishing. At this time we were visited with rain and the country roads became as muddy as only country roads can. The rain brought bad luck in some cases and washed out a few sets of stadia hairs. As a result it was a familiar sight to see "Spike" Pendleton among the branches of the pear trees in quest of the finest cobwebs. Most of the campers spent this week end in Ithaca. The town was infest-

ed with a Senior Week crowd and an active week end was "enjoyed by all present."

The next week started with topography and special work in full swing. Most of the triangulation stations had been erected and were being sighted upon, sounding was started on the lake, and Prof. George was regularly touring the thoroughfares on his bicycle in an effort to keep the levelers on the trail of the benchmarks. In the course of two weeks the countryside had become pretty well littered with our lunch containers, the paper bags and the beauty of the countryside was feared for. Prof. Underwood worked out the practical solution of the problem and informed the campers that it was permissible to burn up such bags and papers provided one did not start a fire. This was evidently a difficult problem. Still that alone would not have solved the difficulties because by that time certain varieties of sandwiches were being left in the bags and cheese is a pretty hard thing to burn. The lunch problem did not impair the real work of camp, however, and the topography was going along well by the end of the week. On Saturday, June 25th, the Juniors, having completed all their special work, left. With the Juniors went the nucleus of the camp orchestra, one "Barry" Barreto whose stars had performed at the Ledyard church festival at a one night stand on Thursday of the second week.

After the departure of the Juniors the camp roll showed ninety-one men left. Most of these remained in camp over the week end attending a dance at Kings Ferry, Friday, and seeing the Kings Ferry ball club beaten by the camp team on Sunday. Some of the boys received invitations to dinner at some farm houses on Sunday and as a result missed the only good meal of the week at camp.

The three-weeks parties acquired an extra amount of activity all through the third week and each party completed its work without the necessity of working all the last night. The three-weeks parties having finished, the camp was now working with seventy-one students and these were to complete the whole five weeks.

At this time the regular baseline was laid out on the state road between Kings Ferry and Ledyard. The Juniors for their purposes had used a baseline in camp but it was not deemed advisable to have one so near camp for the use of the five-weeks men. Thus the baseline was located at a distance of three miles from camp, which was a comparatively short distance after one had spent three weeks at camp. The

length to be measured was approximately half a mile. All the camp strong men were called out for the job of preparing the baseline for measurement. This consisted of making a small survey of the baseline site and driving stakes—the latter for the strong men. Prof. George considered the men capable of swinging the sledge but thought their sense of direction was very poor. The stakes were driven but not quite far enough because they had a tendency to move back and forth along the line. The movement of the stakes was established as a certainty because of the number of different results for the length of the line.

The topography which had heretofore been mostly traversing the plots was now changed by most parties to the taking of detail although some were not as far advanced as others. In taking detail the parties with the shore plots had more to do than those with plots nearer King Ferry, due to the steep slope down to the lake shore and the gullies up which jump traverses had to be run. However the advantage gained by plots nearer town was offset by the longer walk to the plot. By this time sun azimuth was being taken and oftentimes taken again due to the necessity of "check" which had become the password of the camp.

The triangulation system had been made complete with the erection of stations, North Base and South Base, which were located at the northern and southern end of the baseline, respectively. This year's survey was tied in to the previous surveys by angles from stations across the lake to stations erected upon the section being surveyed. Several of the triangulation stations were particularly popular. The shady ones across the lake or the stations near camp and at the same time near a farmhouse where cake and pie were plentiful or an attractive farmer's daughter was present to talk to, of course between reading the necessary angles, enjoyed a large portion of the popularity. Needless to say no angle reading records were broken during this camp but the records of some of the readers were almost broken by the nature of the angles read. Oftentimes the two men on a station were made to feel that the success of the station depended upon that day's work and as a result numerous checked sets were turned in at the end of the day. Still due to the fact that little was known about Prof. Conwell's system of assignments the student was always in doubt as to his destination and partner for the next day.

The topographic leveling was about completed by the middle of the fourth week. The system was carried on from benchmarks of former surveys. Lines of levels were run between plot corners so the elevations of points on plots might be determined. The runs between benchmarks and plot corners were leveled enough times to furnish suitable checks and averages which agreed with the precise level elevations.

Precise leveling besides covering the section being

surveyed was carried further north than the present plot and into next year's section.

No serious mishaps befell our navigators on hydrography. Lines of soundings were taken east and west across the lake between white signals on each shore and also lines in a general north and south direction up and down the lake. The points where these soundings were taken were located by angles subtended by the signals on the shores. The angles were read with a sextant, an instrument which caused many of the embryo surveyors to lose faith in themselves. It was thought by some that there was no real reason why the third man should check the sextant angles. This idea was dispensed with however because Prof. Lawrence insisted upon a bona fide check. For the hydrography the motor launch, Chonondote, was used. The eccentric rolling of this good ship caused one of our juniors from the China Sea to become afflicted with seasickness. One of our captains also experienced the symptoms but the peculiarities of fresh water waves may be blamed for the failings of two tried sailors.

The camp as a whole swung into the fifth week at a fast pace so that each one might be assured of finishing. The parties were beginning their maps and at the same time wishing for the stars to come out so that the star azimuth might be taken. To break the monotony of camp a baseball game between the faculty and the students was suggested and the faculty practised faithfully for a time while the students worked on with surveying. However the game was not played and it was rumored that the faculty were afraid of relinquishing their supremacy in camp to the student ball players. Their attention was turned to the fly casting tournament between Prof. George and Mr. Perry. Prof. George won the medals and cups and Mr. Perry, just to prove that fly casting did not show the worth of a real fisherman, went fishing several times and caught a real fish altho he said he had to throw it back because it was too small.

When Wednesday of the last week arrived and the stars still refused to show themselves sets of star azimuth notes were given out. The whole camp then turned to computing star azimuth. Thursday and Friday of the last week were days of real work. There were some points of detail which had been overlooked, some sun azimuths to be taken and computed, star azimuth computations to be finished and the party maps to be completed. During these two days the baseline was dismantled and the triangulation stations brought in. The parties were supposed to pull up all the stakes and this took a large portion of the time as the location of some had been forgotten and others had been driven deeply.

For Saturday, July 16th, the day of breaking camp all the students were organized into camp duty squads and each squad was in charge of an instructor. Every squad was assigned to a special work.

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PRESENT CONDITIONS AND PLANS IN THE SCHOOL OF CIVIL ENGINEERING

A short discussion of the present conditions confronting the new school,
and of the plans of the school for the future.

By DIRECTOR FRED ASA BARNES, '97

The new College of Engineering began to function a year ago when all freshmen engineers took up the curriculum prescribed by a joint committee of the then existing colleges. In February the new administration took charge and during the second term the organization was gradually completed; so that this fall, as directed by the trustees of the university, the new scheme goes into full effect. Thus the College of Civil Engineering has lost its status as an independent college and becomes a school of the new College of Engineering; and I welcome this opportunity given me by the CORNELL CIVIL ENGINEER to tell its readers, mostly alumni of the old College of Civil Engineering, something regarding the effects of the change and our plans for the new School of Civil Engineering. For it is our hope that the new "school" may prove a worthy successor of the old "college", and that the alumni of the latter will take the same keen interest they have always taken in its affairs and will render as great, or even greater, assistance than they have in the past, to the faculty in its difficult task of maintaining instruction in Civil Engineering at Cornell in the very front rank.

In the process of reorganization, most of the internal functions assumed by the new college by virtue of the resolution of the Board of Trustees were delegated back to the schools in so far as sophomores, juniors and seniors are concerned. The affairs of the freshmen are administered by a freshman administrative committee containing representatives of all the schools and of the fundamental science courses: mathematics, physics, and chemistry. Thus the work in civil engineering goes on practically as before except that we have no freshmen and in our external relations, business and administrative, we deal with the College of Engineering instead of directly with the University.

As to changes in curricula, the most important are that all freshmen engineers get three hours of surveying, two hours of wood shop, one hour of forge, and a common course in drawing of four hours. Formerly students in Sibley College did not get surveying, except as an elective, and civil engineering students did not get shop-work. These changes so crowded the freshman year that integral calculus had to be moved to the second year and it remains to be seen whether a better plan may not be worked out.

In planning for the future we are not entirely

free agents on account of financial limitations but I shall take up at this time only what may be called our routine plans, for the most part within our resources. That is, our immediate problem is to give the best possible training to our students with the funds available.

In general, the individual members of the faculty are the best judges of the essentials in their respective departments and every effort will be made to meet their requirements, which I believe will be reasonable and will take into account the fact that our total budget is small. Each department will have its own budget so that each may plan its own expenditures and be responsible for effectively using its allotment.

The one thing I wish to mention at this time which is not within our resources is the completion of the fund for mounting the twelve-inch object glass for the Fuertes Memorial Telescope, so kindly donated by Prof. Church. Prof. Church is also accumulating a fund for the mounting and the recent gift of five hundred dollars by the Cornell Society of Engineers is gratefully acknowledged. In Prof. Boothroyd, who will be remembered by many of the alumni and who has been in charge of the Department of Astronomy at the University of Washington for nearly a decade, we have an able astronomer and an investigator of rare merit, who will undoubtedly put Cornell on the map astronomically if reasonable facilities are furnished him. It is hoped therefore that the remaining two to three thousand dollars necessary for the mounting will soon be forthcoming so that it may be ordered in time to be put into service next year.

A project already authorized is a small experimental sewage plant which Professor Ogden has desired for some time. This will, through the courtesy of city officials, be built near the sewer pumping station and will be very useful to the Department of Sanitary Engineering in demonstrating some of the simpler processes of sewage treatment and the apparatus used.

At the hydraulic laboratory, the venturi flumes started last year have been completed, a reinforced concrete measuring tank of 2000 cubic feet capacity has been built and calibrated and experimental work will begin soon. The Fitz Overshot Wheel, loaned to a student for experimental purposes but never set up, has now been donated to the school by

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ALUMNI NOTES

'73. M.C.E. '78. Miss Elsie Church, daughter of Irving Porter Church, Professor of Applied Mechanics and Hydraulics, Emeritus, was married on August 18th to Kerr Atkinson, son of the late Prof. George F. Atkinson. The ceremony was performed at Professor Church's home at 9 South Avenue, Ithaca, N. Y.

'78. Frank Bruen has changed his residence from 69 Prospect Street to 29 High Street, Bristol, Conn.

'84. William H. Larned, Jr., University of Nebraska, '21, son of William H. Larned is entering Cornell this fall.

'88. Edward J. Duffies spent several days in Ithaca last June attending the commencement exercises at which his son Edward L. Duffies, '21 received his C.E. degree.

'89. John F. Hayford, Director of the College of Engineering at Northwestern University, has been appointed a Member of the Costa Rica-Panama Boundary Commission by Chief Justice William H. Taft of the United States Supreme Court.

'94. Arthur H. Place has been elected a member of the American Society of Civil Engineers. He is Engineer for the Detroit Bureau of Governmental Research, Inc., Detroit, Mich.

'96. On account of the current depression in the steel industry the connection of Edwin E. Haslam with the Carnegie Steel Company as Hydraulic Engineer was terminated on the completion of his report. Mr. and Mrs. Haslam and their daughter then motored to their old home in Connecticut and then on through the Berkshires returning to Pittsburgh by way of Ithaca, where they stopped over for a little while.

'97. The residence address of H. Gage Balcom is Hastings-on-Hudson, and not Cornwall-on-Hudson as printed in the Alumni List in the June Issue.

M.C.E. '97. Dean E. J. McCaustland of the University of Missouri was elected a Vice President of the Society for the Promotion of Engineering Education at its convention at New Haven, Conn. in June.

'98. Professor John C. L. Fish of Leland Stanford University was elected a member of the Council of the Society for the Promotion of Engineering Education at the same convention in June.

'01. Clarence L. Hartwell has changed his address to 47 Center Street, Kingston, Pa.

'01. Ezra B. Whitman is President of the Baltimore Section of the American Society of Civil Engineers. Whitman was elected an Alumni Trustee of the University last June.

'02. Shirley C. Hulse in a very interesting article in the "Engineering News-Record" issue of July 14th describes how some experiences in pressure grouting led to the design of an hydraulic machine.

'02. Bertrand H. Wait, who is District Engineer for the Portland Cement Association with headquarters in New York City describes a novel method of strengthening concrete paving without increasing the cost in the August 4th issue of the "Engineering News-Record." In the same issue of this magazine Walter S. Edge, '03, describes a new design for a reinforced concrete road which was used in Massachusetts. Mr. Edge is the Chief Engineer for the Concrete Steel Company, with offices in the Company's building in Lower Broadway, New York City.

ex '06. On June 30th last Leigh M. Champaign was married to Miss Katharine E. Van Duzer, daughter of Mr. and Mrs. William Van Duzer, in the first Presbyterian Church at Horseheads, N. Y. Mr. and Mrs. Champaign are now residing in Ithaca.

'06. Robert Coltman, Jr. is Office Engineer with Glenville A. Collins, Engineers, Ltd., whose offices are at 409 Credit Foncier Building, Vancouver, B. C., Canada. Mr. Coltman gives his residence as 2436 First Ave., Vancouver.

'07. Henry W. Maynard is a contributor to the newest of technical journals, "Management Engineering." The September number of this magazine has an article by Mr. Maynard entitled, "Cost Engineering as a Profession." Mr. Maynard is the Cost Accountant of Scovell, Wellington and Co., Public Accountants, 27 William Street, New York City.

'08. Juan Aguilar Almeida was appointed president of the Commission organized at Santiago de Cuba to take charge of the exercises held on June nineteenth in memory of General Jose Miguel Gomez, Ex-President of Cuba, who died in New York City on June the thirteenth.

'10. Carl A. Holmquist, who was formerly Principal Assistant Engineer of the old Division of Sanitary Engineering in the New York State Department of Health, has been appointed Director of the new Division of Sanitation.

'11. Professor Ralph S. Crossman of Des Moines Iowa, has been elected an Associate Member of the American Society of Civil Engineers.

'11. George S. Frank has returned from Kahulu, Oahu, Hawaii, where he had charge of the rebuilding of the radio station in the capacity of Construction Superintendent of the J. G. White Engineering Corporation, and may now be reached in care of that corporation at 43 Exchange Place, New York City. Frank spent a week-end in Ithaca recently, visiting Lincoln Hall and renewing old acquaintances.

'11. Gay Wollenweber, who is a member of the Beasley Contracting Company, of Savannah, Georgia, writes us that his permanent address is Twickingham Terrace, Route A, Savannah. The Beasley Contract-

ing Company completed the Lanes Bridge, which is 6300 feet long and which crosses the Altamaha River, last spring.

'12. William J. Fulton notifies us that his address is now care of R. E. Taylor, Fortuna, North Dakota. Mr. Fulton is the author of "Area Tables for Highway Engineers" which was published in 1920 and also of several short articles on Highway Location and Design which have been published this year.

'12. Hollister Johnson was married on October 20, 1920 to Miss Elizabeth L. Clark of Dryden, N. Y. Johnson is now Assistant Engineer with the Black River Regulating District and is working on the construction of a storage reservoir at Beaver River, N.Y.

'12. Elmer G. Edwards is Highway Engineer with the Bureau of Public Roads, with offices at 410 Hanan Building, St. Paul, Minn.

'12. Mrs. John Beatty has announced the marriage of her daughter Irene Lyfert to Captain Lee Clement Mahoney on June 22, 1921 at Oakland California. The couple are now at home at 3135 Pacific Avenue, San Francisco.

'12. Maurice M. Wyckoff, formerly General Purchasing Agent for the T. A. Gillespie Co. has formed the Wyckoff Engineering Corporation to engage in general engineering and contracting practice. The offices of the corporation are in the Woolworth Building, 233 Broadway, New York City.

'13. Alfred A. Laeazette has changed his address to care of the Standard Oil Co. of Brazil, Rio de Janeiro. Laeazette has recently been elected an Associate Member of the American Society of Civil Engineers.

'13. Harvey T. Munn has changed his address to care of the National Board of Fire Underwriters who are at 76 Williams Street New York City.

'13. Theodore C. Schaetzle, Principal Sanitary Chemist of the Sewage Works of the City of Baltimore, Md., has furnished a very interesting description of "Nine Years Operation of the Baltimore Sewage Works" to the Engineering-News-Record which was printed in their issues of July 14th and 21st. Schaetzle resides at 2604 Maryland Ave.

'13. The August 20th issue of the Railway Review contains a very interesting article by Charles Weiss on the Improvement of Track Maintenance.

'14. Laurence C. Hough is an engineer with the Pitomeer Co. of 12 Hemenway Street, Boston, Mass. Hough has recently been elected an Associate Member of the American Society of Civil Engineers.

'14. John M. Phillips writes that he has changed his address to 7 Clark Street Lancaster, N. Y.

'14. A. B. '11 Louis A. Rodenhiser has changed his address to Petrolia, Texas, where he has a position as Field Manager of the Velvo Oil Company.

'14. M.C.E. '15 Charles S. Whitney is the joint author with George A. Hool of a Concrete Designer's Manual which appeared this summer and was reviewed very favorably in the Engineering News-Record of August 18, 1921.

'15. A son Frank Curtis was born to Mr. and Mrs.

Clark D. Abbott on December 12, 1920. Mr. Abbott is an Assistant Engineer with the Associated Factory Mutual Insurance Company of Boston, Mass.

'15. Frank P. Cartwright, Assistant Engineer of the Bureau of Municipal Research, Rochester, N. Y., has articles in the Engineering News-Record for August 4th on Municipal and Private Building Inspection and for August 25th on Population Density as a Basis for Housing Regulations.

'15. Howard B. Wright has changed his address to 407 Schuyler Street, Syracuse New York.

'15. Ph. D. '17 Poo Wha Chen, Engineer of Construction of the Tientsin-Pukow Line, Chinese Government Railways, Tientsin, China, has an article on "Railway Bridge Construction and Service by American and European Standards" in the Engineering News-Record for July 14th.

'16. Wayne MacVeagh has changed his address to 705 Butt Ave. Sharon, Pa.

'16. Chester A. Thompson is a member of the staff of Seovell, Wellington and Company, Hanna Building, Cleveland, Ohio.

'17. J. Paul Blundon has been appointed Assistant Engineer with the West Virginia Road Commission, with Headquarters at Martinsburg, West Virginia.

'17. Mr. and Mrs. Samuel Everett Hunkin announce the birth of a daughter Nancy on July 16th last.

'17. Benjamin Friedenbarg has been elected a Junior Member of the American Society of Civil Engineers.

'17. Louis Swerdlove passed through Ithaca recently on his wedding trip.

M.C.E. '17. Thomson Mao is Assistant Principal of the Tangshan Engineering College at Tangshan China. This college is part of the newly organized Chiao Tung University.

'18. Ernest C. Fortier is Resident Engineer with the State Land Board at Delhi, Calif.

'18. Adolph O. Infanger is Assistant to Vice-President J. W. Boyle of the West Virginia Meta 1 Products Corporation, 67 Wall Street, New York City. His home address is 90 Glen Street Brooklyn N. Y.

ex '18. Enrique O. Hernandez was married on September 24th to Miss Helen M. Conley of Ithaca.

'19. John C. Gebhard is working for the Bethlehem Steel Bridge Corporation on the construction of a bascule bridge for the Erie Railroad Co. His address is 219 East Eighteenth Street, New York City.

'19. James H. O'Leary is with the Maintenance of Way Department of the New York Central Railroad at Watertown, N. Y.

'20. The marriage of Gordon MacKellar to Miss Rita Cornelius of Ithaca has been recently announced in the Ithaca Journal-News, which also gives Mac Kellar's address as Tamaqua, Pa.

'20. Joseph A. Thomas has been elected a Junior

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THE CORNELL CIVIL ENGINEER

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COLLEGE NOTES

Football. Showing powerful drive throughout and at times, flashes of brilliant football, the Cornell Varsity downed its first opponent of the season, St. Bonaventure, by a score of 41 to 0. Schoelkopf Field was crowded with 5,000 early season football enthusiasts who watched the manoeuvres of the Red and White and of the Brown under ideal football weather. Interest was heightened in the game by the fact that, due to Coach Dobie's strict enforcement of his "secret practice" policy, this was the first time that the 1921 eleven was seen in football togs by the Ithaca fans.

At times, the playing of Dobie's warriors was ragged and loose, due more to their overanxiousness than to their greenness. At other times, the Big Red Team showed flashes of the brand of football that beats teams like Penn and Dartmouth. The score at the final whistle of the game would have stood much higher but for the fact that Cornell lost 95 yards in penalties for off-side play and holding.

During the first quarter neither team scored. Fumbles, which later proved costly to the Varsity occurred at several inopportune moments. In the second period, the team, having warmed up, scored two touchdowns and one goal after touchdown, making the score 13 to 0. In the third period three touchdowns and goals following them were made. In the last quarter, one touchdown and goal was scored.

The center plunging of fullback Leehler, the dash and snappy running of Kaw and Ramsey, halfbacks and Pfann at quarter were easily the features of the game. Eddie Kaw especially seemed to be up to his last year's standard. The good generalship of Pfann and later of Wahl was especially noticeable. In these two heavy-set diminutive quarterbacks the Varsity has two excellent leaders.

Coach Dobie used more than two whole teams in an effort to get a line on his second string men.

Fully 24 men upheld the Red and White. The showing of the second string men was almost as good as that of the Varsity.

The first game of the season, although ragged in parts showed the evidences of some good material. The team seemed to flash possibilities of a Dartmouth or even a Penn defeat. But only the remaining games on the schedule will be able to tell the true story of the Cornell 1921 football team.

The remaining games on the schedule are as follows:

October 8	Rochester	At Ithaca
October 15	Western Reserve	At Ithaca
October 22	Colgate	At Ithaca
October 29	Dartmouth	At Ithaca
November 5	Columbia	At Ithaca
November 12	Springfield	At New York
November 24	Pennsylvania	At Philadelphia

Cornell's New President Dr. Livingston Farrand has been elected by the board of trustees to be Cornell's next president. He has accepted the nomination and on the twentieth of October he will be formally inaugurated.

At the same time the corner stone of the new million and a half dollar Chemistry Building will be laid by the anonymous donor of the building. This ceremony will take place in the morning and the inauguration in the afternoon, but of the ceremonies more later. Dr. Farrand was born in 1867, and after undergoing the usual preliminary education he graduated from Princeton in 1888, and after taking his doctor's degree at the College of Physicians and Surgeons, he went abroad and studied for a year at Cambridge and a year in Germany. In 1893 he returned to this country and taught at Columbia for twenty-one years. From the time he entered Columbia until 1903 Dr. Farrand was a member of the Department of Psychology, but in 1903 he was ap-

pointed to the Chair of Anthropology which he held until his resignation from the Columbia Faculty. Upon his resignation from the Columbia Faculty Dr. Farrand went West and took the post of president of the University of Colorado, which position he was active in for three years. During his presidency of the University of Colorado the state of Colorado underwent a series of terrific and bitter labor disputes. As president of the State University he served on many arbitration boards, and it was here that his wide training and his openmindedness and power of handling men came into full use. In 1904 while at Columbia Dr. Farrand became the Executive Secretary of the National Association for the Study and Prevention of Tuberculosis. This was the first position which he held which enabled him to show his unusual faculties to their best advantage. His position was one which demanded that he organize and get pulling together several elements which were unsympathetic to each other and were rapidly drawing apart. The success with which he accomplished this difficult task only served to emphasize his good qualities. In 1917 he obtained a leave of absence from the University, and went to France to fight tuberculosis among the civilians. The success which he attained is easily shown when it is stated that in 1919 Dr. Farrand was elected chairman of the Central Committee of the Red Cross. From this position he comes to us. With his broad training and his wonderful executive ability and acumen, we have no doubt but that the University will continue to grow and to expand and to become a greater national influence than ever before.

Faculty Notes This year we have two new arrivals in the faculty as announced by the School of Civil Engineering for the first term,—Prof. Dawson, who is taking Prof. Schoder's place for this year, and Prof. Boothroyd. Prof. Schoder is on leave of absence and is engaged in research work in the Hydraulic Laboratory in work under the auspices of the Heckscher Fund, finishing up work originally started by the late Prof. Turner and himself. The other new arrival is Prof. Boothroyd who will take charge of the newly organized department of Astronomy. Prof. Boothroyd has come to us from the University of Washington on the Pacific Coast where he has gained an enviable reputation both as a Professor and as an investigator. The board takes this opportunity to welcome both of these members to the school.

There have also been two promotions within the faculty ranks; John Perry and Carl Crandall, both of the Railroads Department, have been raised to the rank of Assistant Professors. "Johnny" was one of the members of the instructing staff at the camp this past summer, and after the camp was over spent the remainder of the summer at his home in Harrisburg, Pa., resting from his strenuous labors

at the camp. "Carl" spent the summer working in and around Ithaca on odd surveying jobs as is his custom. He is also the supervising engineer for George Fuller Co., the contractor on the rebuilding of the Treman King Building, which burned down last spring. Carl reports that Walter Distler, '13 is the District Manager for this section of the country for George Fuller Co.

Prof. Weber reports that he held down one of the summer school berths, and that while he was neither busy at this job nor putting around his house he was engaged in some stream gaging work on the east branch of Owego Creek over the Hill.

Prof. Burrows handled the work of his department at summer school and in addition cleared up some work he had been doing for the city on their bridges and also investigated some work for the Ithaca Traction Company.

During the intermission between graduation exercises and the opening of summer school Prof. Barnes took a few days off and ran down to his old home at Stockbridge, Mass. After staying there a few days he went to Greenwich, where he stayed for about a week, attending the meetings of the Society for the Promotion of Engineering Education. While there were several Cornell graduates at the meeting Prof. Barnes was the only member of the Cornell faculty present. Dean Kimball had also expected to be at the meeting but at the last moment found that he would be unable to attend.

Prof. Seofield attended the meeting of the American Society for Testing Materials at Asbury Park held just after Commencement.

During the past summer Prof. Walker has been engaged in experimental work for the New York Milk Conference Board. There were in all three lines of work which he pursued in his investigations. The purpose of his work was to determine the effect of stream pollution on fish life in that stream, and to what extent pollution was permissible. The first of the three lines of work involved the treatment of wastes or wash water from a milk bottling plant in septic and Imhoff tanks, followed by sand, stone, and lath filters. The second of the lines followed up was the treating of whey. This method involved boiling the whey with live steam, and septic tank and sand filter treatment. The third line of study was determining the effect of the effluents from the septic and Imhoff tanks, and from sand, stone, and lath filters and of whey and skimmed milk upon fish life. The Civil Engineer hopes in the near future to be able to place before its readers an abstract of the report which Prof. Walker is now preparing for the New York Milk Conference.

Charles R. Vanneman '03

The State Public Service Commission on September 20, announced the appointment of Charles R. Van-

neman '03 as Chief Engineer of the Commission at a salary of \$8,000 a year. Mr. Vanneman was formerly with the Old Public Service Commission of the Second District from 1910 up to the time of the creation of the present Commission. He was originally appointed by the old Commission as Inspector in the Division of Transportation. Subsequently in 1914 he became Chief of Division of Steam Railroads, and in 1918 his duties were extended to include those of the Engineer of Grade Crossings. Later as Chief of Divisions of Railroads he had charge of steam railroads, electric railroads and grade crossing eliminations in the State, outside of Greater New York.

His new position as Chief Engineer places him in charge of engineering and inspection work for the commission of all steam railroads, street railroads, grade crossings, electric light companies, gas companies, telephone and telegraph companies throughout the State.

Previous to his appointment in the old Commission Mr. Vanneman was Acting Chief Examiner of the State Civil Service Commission and Assistant Engineer for the State Engineer and Surveyor. Prior to that time he had been for some time in the employ of the Pennsylvania Railroad. His present home address is 555 Providence St., Albany, N. Y.

**Oxford-Cambridge
Princeton-Cornell
Track Meet** One of the most interesting international contests in college sportdom took place on July 28, on the grounds of the New York Athletic Club at Travers Island, New York City, when the Oxford-Cambridge track team succeeded in tying the combined track teams of Princeton and Cornell. The showing of Oxford Cambridge came as a distinct surprise after its defeat at the hands of Yale-Harvard on Saturday, July 24. The meet was scored on the basis of firsts only. In the ten-event program each team scored five individual successes and since there was no provision for deciding the victory on the number of second positions registered the meet was officially declared a tie. Had second positions been counted the Oxford-Cambridge team would have won, it having 5½ seconds to Princeton-Cornell's 4½. An unexpected recovery by the British collegians in the closing two events proved the biggest surprise of the meet. With eight events completed the Princeton-Cornell combination was leading its rivals from across the sea by five victories to three. The running broad jump and the half mile run remained to be decided. H. M. Abrahams of Cambridge captured the broad jump and Bevil, G. D. Rudd, Oxford captain and Olympic 400-meter champion, scored a spectacular victory in the half-mile run, closing the program.

The English athletes trailed when four events had been decided at 3 to 1. Stallard's victory for Cambridge in the mile made the score 3 to 2, Massey

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of Princeton took the 120 yard high hurdles and gave America a lead of 4 to 2. Nokes of Oxford next captured the hammer throw and pulled the visitors to within one point of the home-breds again, but a victory by Forseman of Princeton in the three mile run put America in front by a score of 5 to 3. Then came the sterling victory of Abrahams in the broad jump and Rudd in the half-mile giving England an even break in the distribution of points.

Abrahams proved the star of the meet. This sturdy son of Cambridge was the only entrant to more than win one event. He started off the meet by winning the 100-yard dash in 10 and 2/5 seconds, with Lovejoy of Cornell second. Then when his countrymen were slightly downhearted he started the comeback by winning the broad jump with a leap of 21 feet 8 inches.

THE OXYGEN CONSUMED TEST

(Continued from Page 6)

the value desired, "x", the concentration, in per cent corresponding to "y", "m", the Y-intercept; "n", the slope, obtained from a curve drawn from the averages of the results at various concentrations of several samples, preferably having a wide range in strength.

4. The value of "n" is a constant for any particular waste and apparently does not vary much for a wide range of wastes.

Tables I to VI are given on pages 15 and 16.

TABLE I

MONTH	OXYGEN CONSUMED IN P.P.M. BY A PER CENT CONCENTRATION OF								
	1.96	4.76	9.09	25	50	100	0.002	0.005	0.01
	MULTIPLIED BY A CONCENTRATION FACTOR OF								
	51	21	11	4	2	1	50000	20000	10000
RAW MILK WASTE									
NOVEMBER	81.3	58.3	52.9						
DECEMBER	140.2	123.8	115.7						
JANUARY	188.6	169.2	146.8						
FEBRUARY	146.3	124.0	101.0						
AVERAGES	139.0	118.8	104.0						
SEPTIC TANK EFFLUENT (MILK WASTE)									
NOVEMBER	42.5	39.3	32.2						
DECEMBER	59.0	49.4	40.3						
JANUARY	58.0	46.2	42.7						
AVERAGES	53.2	44.9	38.4						
IMHOFF TANK EFFLUENT (MILK WASTE)									
NOVEMBER	38.7	28.6	25.1						
DECEMBER	66.4	48.6	43.5						
JANUARY	98.7	82.3	65.2						
FEBRUARY	90.8	70.3	64.6						
AVERAGES	73.6	57.5	49.6						
SAND FILTER EFFLUENT (MILK WASTE)									
NOVEMBER	7.75			5.02	4.46	3.73			
DECEMBER		6.80		6.15	4.57	3.77			
JANUARY				5.24	4.90	4.26			
MARCH	9.10	7.11	6.42	5.40	4.91	4.00			
AVERAGES	8.42	6.95	6.42	5.45	4.72	3.94			
PERCOLATING FILTER EFFLUENT (MILK WASTE)									
NOVEMBER	26.0			12.9	9.8	9.1			
DECEMBER	29.1			15.4	12.5	11.2			
JANUARY				26.4	21.7	18.8			
MARCH	32.2	24.1	21.3	17.5	14.5	12.5			
AVERAGES	29.1	24.1	21.3	18.0	14.6	12.9			
ITHACA RAW SEWAGE									
DECEMBER	105.0	80.5	70.8						
JANUARY	170.0	151.6	134.3						
AVERAGES	137.5	116.0	102.5						
SEPTIC TANK EFFLUENT (ITHACA SEWAGE)									
DECEMBER	48.5	41.5	37.0						
JANUARY	116.0	95.6	81.0						
AVERAGES	82.2	68.5	59.0						
WHEY									
NOVEMBER							72 500	61 500	59 250
DECEMBER							60 625	55 062	49 562
JANUARY							71 800	65 350	56 400
AVERAGES							68 308	60 637	53 404
GRAND AVERAGES	74.7	62.5	54.5						

ITHACA SEWAGE

TABLE II

DATE	OXYGEN CONSUMED IN P.P.M. BY A PER CENT CONCENTRATION OF		
	1.96	4.76	9.09
	MULTIPLIED BY A CONCENTRATION FACTOR OF		
	51	21	11
RAW SEWAGE			
DECEMBER 2	110	66	56
9	111	86	77
16	100	95	85.6
18	99	75	64.6
DEC. AVERAGE	105	80.5	70.8
JANUARY 7	180	171	153
14	145	124	109
15	181	163	146
21	185	160	141
28	159	140.2	123.6
JAN. AVERAGE	170.0	151.6	134.3
SEPTIC TANK EFFLUENT			
DECEMBER 2	50	38	32
9	52.5	46	41
16	47	45	44
18	44.5	37	33
DEC. AVERAGE	48.5	41.5	37.0
JANUARY 7	128	125	94
14	105	86	84
15	122	102	87
21	110	89.2	75
28	115	76	70
JAN. AVERAGE	116.0	95.6	81.0

WHEY

TABLE III

DATE	OXYGEN CONSUMED IN P.P.M. BY A PER CENT CONCENTRATION OF		
	0.002	0.005	0.01
	MULTIPLIED BY A CONCENTRATION FACTOR OF		
	50000	20000	10000
NOVEMBER 11	65000	64000	60000
15	65000	62000	57000
17	85000	66000	64000
29	75000	54000	56000
NOV. AVERAGE	72500	61500	59250
DECEMBER 1	75000	63000	50000
2	60000	58000	53000
6	65000	57000	56500
8	57000	52000	46000
9	62000	60000	52000
15	52000	45000	45000
16	35000	48000	44000
20	59000	57500	50000
DEC. AVERAGE	60625	55062	49562
JANUARY 6	52000	47500	45000
10	58000	56000	53000
12	115000	102000	70000
13	70000	68000	60000
17	75000	72000	64000
19	70000	60000	55000
20	65000	66000	54000
24	75000	58000	56000
26	73000	60000	53000
27	65000	64000	54000
JAN. AVERAGE	71800	65350	56400

MILK WASTE

TABLE IV

DATE	OXYGEN CONSUMED IN P.P.M. BY A PER CENT CONCENTRATION OF									
	1.96	4.76	9.09	25	50	100	MULTIPLIED BY A CONCENTRATION FACTOR OF			
	51	21	11	4	2	1				
	SAND FILTER EFFLUENT									
NOVEMBER	5			4.3	3.6	3.2				
10	7.8			5.4	4.9	3.8				
15	8.2			5.6	5.0	4.3				
19				3.9	3.4	2.8				
24	7.25			4.2	3.6	3.0				
29				6.7	6.1	5.3				
NOV. AVERAGE	7.75			5.02	4.46	3.73				
DECEMBER	3			6.9	5.2	4.4				
8		7.4		5.8	4.2	3.4				
13		6.2		5.4	3.8	3.56				
17				6.5	4.65	3.6				
22				6.1	5.0	3.9				
DEC. AVERAGE		6.80		6.15	4.57	3.77				
JANUARY	10			4.5	4.1	3.5				
14				5.4	4.8	4.28				
17				5.7	5.6	5.00				
24				5.8	5.5	4.6				
28				4.8	4.5	3.9				
JAN. AVERAGE				5.24	4.90	4.26				
MARCH	2	11.0	8.1	7.5	6.3	5.8	5.4			
5	8.3	6.14	5.5	4.8	4.5	3.3				
9	10.0	8.4	7.18	6.1	5.54	4.2				
11	7.1	5.8	5.5	4.4	3.8	3.1				
MAR. AVERAGE		9.10	7.11	6.42	5.48	4.91	4.00			

PERCOLATING FILTER EFFLUENT

NOVEMBER 3			11.6		8.6	7.8
9	25.4		14.3		10.7	
12			9.0		7.0	6.9
17			11.0		7.86	6.56
22	24.6		12.2		9.9	9.6
26	28.0		19.6		15.2	14.7
NOV. AVERAGE	26.0		12.9		9.8	9.1
DECEMBER 1			9.9		6.3	5.72
6			14.7		11.0	11.0
10	29.1		16.56		14.44	13.8
15			20.0		17.4	
20			15.74		13.2	14.5
DEC. AVERAGE	29.1		15.4		12.5	11.2
JANUARY 7			27.2		20.1	17.5
12			21.2		17.5	15.7
18			30.8		27.6	23.1
JAN. AVERAGE			26.4		21.7	18.8
MARCH 3	23.2	19.1	17.0		14.3	12.9
4	26.1	20.3	18.0		15.5	14.0
7	38.2	29.0	25.0		21.1	16.8
10	41.3	23.3	23.3		19.0	17.5
MAR. AVERAGE	32.2	24.1	21.3		17.5	16.6

MILK WASTE

TABLE V

DATE	OXYGEN CONSUMED IN P.P.M. BY A PER CENT CONCENTRATION OF									
	1.96		4.76		9.09		MULTIPLIED BY A CONCENTRATION FACTOR OF			
	51		21		11					
	SEPTIC TANK EFFLUENT									
NOVEMBER	5	30	32	2.7						
	10	30	27	2.2						
	15	40	36	2.9						
	19	55	47	4.0						
	24	45	40	3.2						
	29	55	52	4.3						
NOV. AVERAGE		42.5	39.3	3.2.2						
DECEMBER	3	60	44	3.0						
	8	60	54	4.0						
	13	55	43	39.5						
	17	45	41	38						
	22	75	60	54						
DEC. AVERAGE		59.0	49.4	40.3						
JANUARY	10	45	36	38						
	14	65	60	58						
	17	50	41	41.5						
	24	40	30	27						
	28	90	64	52						
JAN. AVERAGE		58.0	46.2	42.7						

IMHOFF TANK EFFLUENT										
NOVEMBER	3	20	15	12						
	8	55	45	42						
	12	30	23	18						
	17	47.5	29	22.3						
	22	45	33	32						
	26	35	27	24						
NOV. AVERAGE		38.7	28.6	25.1						
DECEMBER	1	40	33	27						
	6	60	56	58						
	10	52.5	40	41.5						
	15	70	47	42						
	20	110	67	49						
DECEMBER AVE.		66.4	48.6	43.5						
JANUARY	7	95	66	67						
	12	47	40	40						
	18	160	122	100						
	20	90	98	57						
	25	110	94	70						
	30	90	74	57						
JAN. AVERAGE		98.7	82.3	63.2						
FEBRUARY	1	110	76	71						
	3	85	66	62						
	6	70	64	57						
	7	90	58	53						
	8	70	60	51						
	10	120	98	94						
FEB. AVERAGE		90.8	70.3	64.6						

RAW MILK WASTE

TABLE VI

DATE	OXYGEN CONSUMED IN P. P. M. BY A PER CENT CONCENTRATION OF					
	1.96		4.76		9.09	
	MULTIPLIED BY A CONCENTRATION FACTOR OF					
	51	21	11			
NOVEMBER	70	40	35			
3	50	38	34			
8	125	84	79			
10	15	12	14			
12	170	128	120			
15	55	24	19			
17	102.5	46	42.5			
19	120	84	78			
22	65	56	52			
24	20	18	15			
26	100	88	72			
29	85	82	74			
NOV. AVERAGE	81.3	52.9				
DECEMBER	105	96	78			
3	150	118	88			
6	170	165	162			
8	140	112	110			
10	129	127.5	102.5			
13	140	118	119.5			
15	387.5					
17	115	98	81			
20	150	132	157			
22	165	142	134			
DEC. AVERAGE	140.2	123.8	113.7			
JANUARY	220	198	164			
7	35	28	22			
10	270	242	223			
12	230	174	162			
14	125	138	135			
17	320	280	241			
18	420	408	303			
20	30	24	21			
24	250	256	231			
25	150	110	102			
28	100	78	69			
30	188.6	169.2	146.8			
JAN. AVERAGE	235	226	152			
FEBRUARY	190	176	152			
3	20	20	17			
6	20	20	17			
7	128	120	93			
8	185	126	124			
10	120	76	66			
FEB. AVERAGE	146.3	124.0	101.0			

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PLACING CONCRETE UNDER NOVEL CONDITIONS

(Continued from Page 4)

extended down from this hopper and could reach as far back as the old work, a distance of usually forty feet. This chute was pivoted at the hopper and had a wheel at the other end to facilitate moving it around. The floor had several trap doors from which light metal lateral chutes extended. In this way the form was well served without much labor expended in hauling the concrete with hoes.

As it took from five to six hours to fill the roof portion of a forty foot form, the chute was moved around quite frequently to prevent laminations in the roof slab, by one layer partially setting before the next layer was added.

The record day's work of placing was made by filling an eighty foot section of steel form, containing 620 cubic yards of concrete in a net working time of fifteen hours, ten minutes, working two shifts, making an average of one cubic yard of concrete placed every minute and a half for the entire time.

Sequence of Operations in Placing

The structure throughout the entire contract (except at the station) was of reinforced concrete, four tracks wide and entirely above mean high water. The first step after preparing the sub-grade was to place the center and one of the quarter wall footings. See A and B Fig. 1. After the removal of the

BETTER LIGHTING NEEDED IN INDUSTRIAL PLANTS.

In a paper read before the Illuminating Engineering Society, February, 1920, entitled, "A Survey of Industrial Lighting in Fifteen States," R. O. Eastman submitted some very interesting data regarding the lighting conditions in industrial institutions. The survey comprises some 446 institutions, in which lighting was considered by 55.4% as being vitally important, and by 31.6% as being moderately important, and by 13% as being of little importance. Practically 58% considered that lighting was as important as power in the operation of the plant, and a small proportion would give more attention to lighting than to anything else.

In considering the present condition of lighting as found in the various plants, only 9% ranked as excellent, about 1/3 ranked as good, 29% fair, 18.8% poor, 3.5% very poor, and 7.8% partly good and partly poor. It was found that the lighting in the offices was far superior to that in the shops; 19% being excellent, 36% good, 31% fair, and only 13% poor and none very poor.

On consulting the executives regarding what factors were most important in considering lighting, the following facts were revealed: Increase of production 79.4%, decrease of spoilage 71.1%, prevention of accidents 59.5%, improvement of good discipline 51.2%, and improvement of hygienic conditions 41.4%. Manufacturers who have good lighting appreciated its value largely from the standpoint of its stimulating effect upon output.

There is no question that any intelligent man who carefully considers the necessity for good lighting in an industrial plant, will agree that it is impossible for a person to do as good work, either in quality or quantity, in poor light as in good light, but yet the result of a careful analysis discloses the fact that only about 40% of industrial plants are furnishing good light to their workers and 60% are operating under poor lighting. It is hard to understand why such a proportion of concerns can be satisfied with a condition which is universally admitted to be a curtailer of efficiency and a prolific causer of accidents. The principal cause of this condition is that those in charge of such establishments have not given the attention to lighting that it demands. They do not know what constitutes good lighting, and in their absorbing interest of other factors of production have overlooked a vital one.

Every safety official should deeply interest himself in the lighting of his plant and insist upon good lighting as much as good goggles, good guards and other necessary accident prevention equipment. Every production manager should insist upon good lighting because the efficiency of the working force is increased by the condition of the lighting furnished. The plant physician should examine the lighting, for eye strain and eye fatigue are directly affected by poor lighting, as is the hygienic condition. Well lighted plants are invariably cleaner than poor lighted places. Plants equipped with Factrolite Glass in all windows are well lighted.

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forms from the footings the track slab C in Fig. 1 was placed between them, the other wall footing, (D) was then placed and the track slab (E) placed between them. The outside or local slabs (F and G) were next placed to the neat line including the bent rods, which tie the floor and side walls together. The ducts were next laid just inside the side wall. A form was placed four inches from the face of the ducts from track slab to the top of the ducts and two feet of the side wall form was built above the top of the ducts. This was poured in one operation (H and I) the concrete completely surrounding the ducts and effectively tying them to the side wall without the use of straps and anchors.

The remainder of the subway consisting of the three interior walls above the footings, the remainder of the side walls and the roof of all four tracks (K) was then placed in one operation, usually for a length of forty or eighty feet.

Placing In Freezing Weather

The winter being abnormally severe, considerable care was exercised to prevent the concrete from freezing. The sand in the large bin was thawed out by means of steam passing through a flexible pipe from one of the dinkeys stationed on a side track over the bin. Another steam pipe led to a coil in the water tank with a branch to the small sand bin over the mixer. The evening preceding the day on which a forty foot section was to be concreted, a tarpaulin was hung at each end of the steel form and a salamander, burning coke, was placed in each track and kept burning all night. By this means the steel form was warm to the touch in the morning. The minimum temperature at which concrete could be placed in the form was fixed at forty degrees Fahrenheit and as a rule the concrete reached the forms between fifty and fifty-five degrees. After the concrete was placed, it was covered with salt hay and a tarpaulin spread over it. In very severe weather the salt hay was omitted and steam from the crane boiler was discharged under the tarpaulin all night.

Conclusion.

The length of the contract was 4,779 lineal feet and the line was a four track wide subway structure constructed entirely of concrete. The final estimate

of the cost of construction was \$2,043,162.31. The work was done by the Tidewater Building Company in conjunction with Thomas B. Bryson, Contractor, and was completed in exactly two years and fourteen days.

REPORT OF THE CHIEF ENGINEER, 1923 SUMMER CAMP

(Continued from page 8)

The assignments were as follows: Living tents; Mess, kitchen, and computing tents; Latrine; Baggage; and Checking. A baggage car was chartered to take all the baggage into Ithaca and trucks were to be used to take a part of the camp equipment to Aurora, the site of the 1922 camp. The quartermaster surpassed all former records and aroused the camp at 5.00 A. M. on Saturday. Soon after breakfast the work of breaking camp was begun. At about eleven o'clock the camp had disappeared and work at Kings Ferry was completed. The main body of students took the 11:34 train to Ithaca while one squad remained to help in transporting equipment to Aurora. After arriving in Ithaca the party spent the remainder of the afternoon unloading baggage and storing the tents in Lincoln Hall.

The work in connection with camp was all completed by 6.00 P. M. and the erstwhile campers were off each one with the firm conviction that he had endured more hardships and had more enjoyment out of camp than any former campers. There was borne way back in the mind of each one an idea that he could survey almost anything from stars to lake bottoms.

The instruction in the work of the camp was given by the following men: Precise Leveling—Prof. Underwood; Topographic Leveling—Prof. George; Triangulation—Prof. Conwell; Baseline—Prof. George; Hygrography—Prof. Lawrence; Topography—Messrs. Perry, Pendleton, O'Rourke, and Chobot. Prof. Underwood had charge of the camp and Mr. Chavanne acted as camp clerk and supervised the camp duty squad each day. The student officers of the camp were as follows: T. Telfer, Chief Engineer; H. P. Bosworth, Assistant Chief Engineer; J. H. Peters, Quartermaster; J. J. Fleming, Assistant Quartermaster; D. G. MacBean, Commissary.

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PRESENT CONDITIONS AND PLANS IN THE SCHOOL OF CIVIL ENGINEERING

(Continued from page 9)

the Fitz Waterwheel Co. and has been mounted. It is expected that the auxiliary apparatus for testing the wheel will be mounted soon and the whole layout housed.

To enable Dr. Schoder to complete the work begun by him and the late Prof. Turner, we have received a grant from the Heekseher Fund for the purpose of hiring a substitute for Dr. Schoder for the first term. Dr. Schoder will also be on leave the second term of the coming year and thus will be enabled to spend the entire year on research and experimental work.

For our Testing Laboratory, we have purchased a small Austin Cube mixer, and a Ro-Top Testing Sieve Shaker so that the work may be carried on in a modern and standardized way. Considerable equipment has also been added in the Sanitary and Highway Laboratories and it is hoped that interest in research may be stimulated by these various means.

In external relations we plan to have our faculty take an active part in the affairs of the various national societies and to make the work of these organizations a real vital force in the life of the college by bringing home the results of the work to our students. The new student chapter of the American Society of Civil Engineers will help materially along these lines, but we plan to encourage members of the faculty to join appropriate national societies and to attend their meetings. The policy of having lectures by practicing engineers will be continued and it has been suggested that some of our alumni may find it possible to spend several days

with us from time to time giving special lectures and instruction.

By these various means we hope to establish and maintain better contact with the practice of engineering in all its branches, believing this to be a vital need for our school and its faculty. We trust that we may count on the support and suggestions of all Cornell Civil Engineers in making the school a success. The immediate reputation of Cornell in Civil Engineering depends on the work of the men already graduated. We believe it is safe in their hands and we will be glad to help wherever it may be possible. The future depends on the work of the present faculty. It, too, is in safe hands but the co-operation of all is demanded for the best results.

ALUMNI NOTES

(Continued from Page 11)

Member of the American Society of Civil Engineers. His street address in Manila, P. I. is 134 San Marcelino.

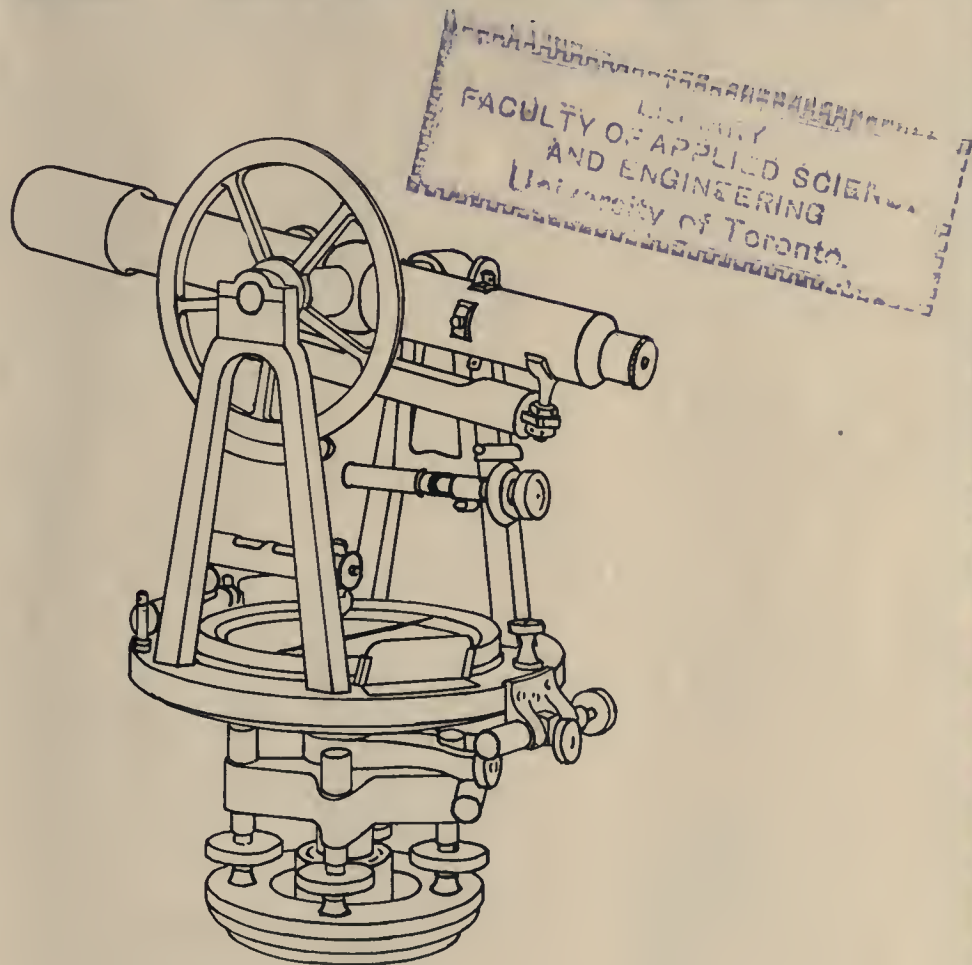
'21. W. W. Wannamaker gives his address as 966 Heard Avenue Augusta Ga.

M.C.E. '20. The second wedding of Chinese students ever solemnized in Ithaca took place on August 25th when Miss Alice Dorothy Moy became the bride of Chia Tsun Yeh at the home of Min Sin Kwei, 113 Ferris Place. Yeh was attended by his brother C. Y. Yeh M.M.E. '21, and Mrs. Kwei was the Matron of Honor. Miss Moy was a student at the University of Michigan where her husband took his M. S. degree last year. The guests were nearly all students or graduates of the School of Civil Engineering, and all were Chinese except Director Barnes, '97, Mrs. Barnes, E. A. Dahmen, '06, Mrs. Dahmen, and Dr. Richards, who performed the ceremony.

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NOVEMBER, 1921

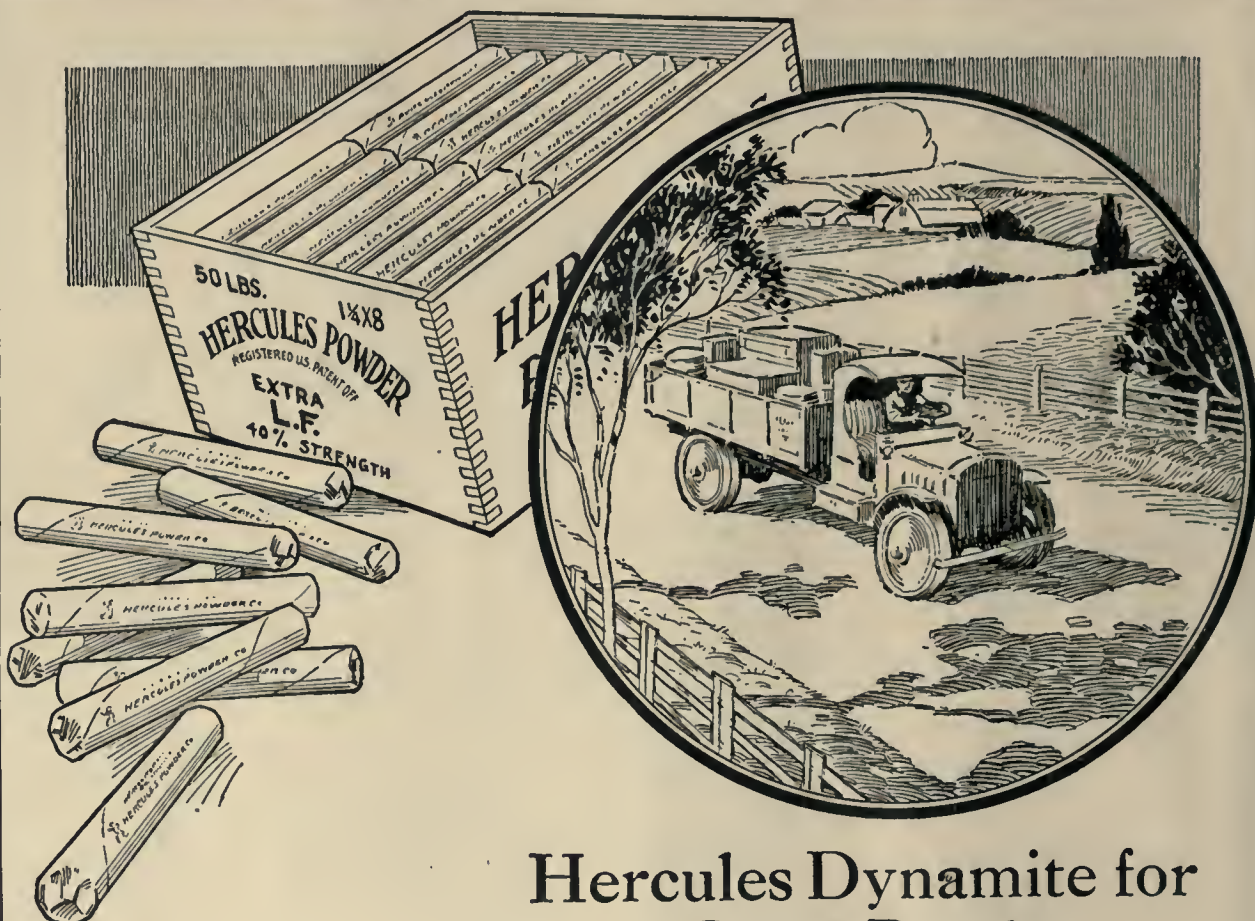
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In this article we have a vivid description of a gigantic piece of work in one of the United States most valuable possessions. Having spent so long a period of time in this field, Mr. Rappleye is especially fitted to give us an inside view of the work of the U. S. Coast and Geodetic survey.

Small Sewage Disposal Plant Operation, by Comm. L. F. Bellinger, '87..... 23

Being Public Works Officer of the United States Naval department, Mr. Bellinger can give us an excellent idea of how that department solved the sewage disposal problem. He shows, in a brief manner how the Chlorine process is more economical than the niter cake process as a purifier. He also suggests several improvements for the average sewage disposal plant

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IN the construction of modern highways, time-saving machinery has taken the place of the huge armies of artisans which, by brute strength accomplished the road-building of the Egyptians and Romans.

The nerve center from which modern highway building radiates is the concrete mixer. Without it, the present wonderfully developed system of paved roads would be only a chimerical dream.

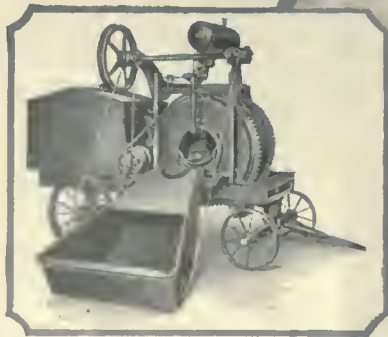
The concrete mixer has made possible the economical building of culverts, the rapid construction of bridges and approaches, the placing of concrete foundation for brick and other two-course pavements, and—probably its greatest achievement of all—the construction of the thousands of miles of smooth, hard and enduring concrete roads reaching across all sections of the land.

There is a particular type of concrete mixer for each of these phases of road engineering.

Culvert construction demands very much different equipment from paving construction. An average culvert requires the mixing of only a few cubic yards of concrete. Wherever, along the road to be paved, a cross ditch or sharp hollow happens to lie, there a culvert must be built.

To meet these conditions the Koehring Dandy Light Mixer is used. It is sturdy and substantial, yet light in weight and easily portable from culvert to culvert in quick time by truck or team.

The Dandie's quick mobility arises in part from its small size; its capacity of 4 and 7 cubic feet of mixed concrete are just right for the well planned culvert project.



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EDITORIALS

EDUCATION BY OBSERVATION

The faculty of correct and keen observation like the faculty of concentration is of inestimable help in the acquisition of learning or the gaining of an education. Engineering, as well as other professions, can be learned more quickly and to better advantage when the faculty of observation is brought into play to reinforce study. For instance, the eye picture of a concrete mixer in operation is a much more comprehensible, tangible and impressive image in the mind than the word picture gotten out of the description of its operation in a text. And so it is with many more of the operations and methods used in all sorts of professions.

The student of today seems to be blind to the opportunities of learning new things by observation. He puts more faith in what his text book (which is anywhere from one to five years old) says about certain engineering methods and operations than he does in the systems being used in the latest construction work. In fact, he even fails to make it a point to visit any or all construction work to which he has easy access and to study and observe the methods being carried out. We have proof of this, right here on our own campus in the construction of the new \$1,500,000 Chemistry Laboratory directly behind Lincoln Hall. While the civil engineering students sit in their classrooms in Lincoln Hall reciting on "concrete" or "bridges" or making or testing materials in the materials laboratory they can hear the characteristic whirl and whine of several concrete mixers coming from the direction of the new Chemistry Laboratory. During the summer, had school been in session, they would have heard the puff and clang of the steam shovel. In a few months they will hear the rat-a-tat-tat of the riveting hammer. Concrete is already being placed and steel will soon be erected within plain sight of the civil engineers of the future. And yet, we venture to say that not more than a handful of civil engineering students will stroll over to the new Chemistry Laboratory with the intent purpose of observing the methods of construction. We feel sure that the engineers in charge would be only too glad to accompany a body of students around on an inspection trip. More could be learned

and more remembered longer about building construction by means of a one-hour thorough inspection of this one building now under construction than could be learned from a five hour perusal of a text on building construction.

Last year one of our alumni wrote us, and, in his criticism of the present civil engineering curriculum he strongly advocated summer inspection trips to various plants and construction works. He thought it of paramount importance that the engineer during his student days should have the opportunities of seeing and observing for himself his classroom theory carried out in practice. He considered it very unfortunate that our curriculum did not include these summer inspection trips and visits and strongly urged the student himself to remedy the deficiency by visiting every plant and construction work that he possibly could.

In one of his lectures Professor Ogden tells of a student who had the correct idea of the value of observation as an aid to education. Several years ago Professor Ogden used to take frequent walks about the campus and in the neighborhood of Ithaca with several of the civil engineering students. He noticed that one student in particular always scrutinized very closely every bridge that was approached. After passing over the bridge this student would pull out his notebook and jot down a few lines about and draw a few sketches of the bridge. On being questioned by Professor Ogden the student replied, "I expect to be a bridge engineer some day and I'm interested in all sorts of bridges. I like to find out all about the essential details of the different types of bridges." This student had the correct idea. Today, he is probably the chief engineer of a bridge company or a bridge erecting contractor. He recognized the value and importance of observation to an engineer. There ought to be more like him.

TECHNICAL JOURNALISM AS A PROFESSION

Engineering is sub-divided into more branches and specialties than any other one profession. It is for this reason that the engineers in general do not relish the idea of adding another specialty to or sub-dividing a branch of the already much sub-divided

profession. This time it is the addition of a specialty. Whether we relish the idea or not, however, we must admit that the addition is very much to the credit of the engineering calling.

It is not even a generation ago that there was no technical journalism in the sense we know it today. The vision and ability of such publishers as Mr. Hill and a long line of brilliant, energetic, editors as typified by Mr. Charles W. Baker built a firm foundation for technical journalism to stand on and then reared the superstructure along such sound principles and standards that the engineering world simply had to recognize journalism as a true technical profession.

Today, technical journalism seems to be so well established that engineering graduates consider entering it as a field for life work just as they consider bridges, hydraulics, highways, or railroads. Last June several men who were about to graduate were overheard discussing the merits of journalism along with those of other branches of engineering.

Technical journalism, however, differs slightly from the other sub-divisions of engineering. Before a man can become a good technical journalist he must have some wholesome experience in practically every branch of civil engineering, or he must acquire this experience along with his journalistic work. This is a pre-requisite which is not required in following the ordinary pursuits of civil engineering. Men who are thinking of entering the field of technical journalism should bear this in mind.

COLLEGE SPIRIT

The students of the School of Civil Engineering comprise but a small percentage of the total registration of the entire University. As a whole they follow the activities of the University very closely; indeed many of them are important cogs in the undergraduate affairs of the University. But on the whole the activities within the college of Engineering and within the School of Civil Engineering are not followed closely by many and in fact by many are not followed at all. It is to those many that this editorial is especially addressed.

The thing that at present the School lacks is interest in Athletics. Not since many years ago have we fully upheld the record of the School of Civil Engineering in the Athletic Line. There was a time back several years when C. E. teams were the most feared of the Intramural Teams, and when trophy after trophy was brought home to the Library of the School. But for the past five years trophies have been few and far between, and banners for the highest number of points gained in the various intercollege sports throughout the year have been nonentities as far as we have been concerned. In fact the college has fallen so low that when inter-college sports are spoken of and the term Engineers is used to refer to any group of contestants Engineers refers to Sibley teams, and for us the term C. E. is used.

This may sound like mere noise to those optimistic few who see this, but the facts stood out in the write-up of the Intercollege track meet last Spring, which was won by Sibley men. The headlines ran something like this "Engineers win meet." Down in the article we find out that Engineers meant Sibley, and that our men went under the title of C. E.'s. Is there any reason why M. E. should be the "Engineers" and we C. E.? It is up to us and not merely one or two of us but up to every last one of us. By the end of this year we cannot hope, nor probably by the end of next year can we hope, but in three years we can hope to build up such a reputation that Sibley men and Franklin men will be classed as M. E.'s or E. E.'s and when Engineer is mentioned on the Campus men from Lincoln will be thought of. The time to make the start is now. Teams for soccer and for cross-country are practising daily for the Intercollege games and the race. The registration for both the C. E. Soccer team and for the Cross-Country race has been very low, and there have hardly been enough candidates out for soccer to make up a single team, let alone two so that scrimmages might take place. It is probably too late to make up for the lack of material in soccer now. But basketball practice will start soon, and there should not, must not, be any dearth of candidates out for the team if we are to have any chance to win the basketball championship.

Last year the final score in the Intercollege Pennant Race was as follows: Agriculture, 54; M. E., 41; Chemistry, 37; Arts, 32; C. E., 28; Vet., 20; Architecture, 6; and Law, 2. Ahead of us three larger colleges and one smaller one,—behind us three smaller colleges. But of the colleges ahead of us the one smaller than ourselves is the one with the most college spirit probably of any college on the Hill, Chemistry. They are an example of what even a little college spirit will do for a college. Probably the best promoter of College Spirit is the frequent meetings of men in the college where they can mingle on common grounds with no outsiders among them, so that everybody may soon come to know everybody else. Strange as it may appear to some we have just such an Association. Its title is the Cornell Association of Civil Engineers, and meetings are held about once a month in one of the campus buildings, usually Barnes Hall. When there is a notice of a meeting posted come around to it—don't wait for an engraved invitation—if you weren't wanted the invitation wouldn't be hung in a public place like the bulletin board. Don't be bashful.

Next time Fritz hangs up a sign entitled "Candidates for the ——— team sign below," sign up. Let's get a good start this year and get things moving well right from today. If you can't play the sport in question come around to practice and to the games and watch the other fellows. A friendly audience helps a lot sometimes. Alright—everybody set—then let's go.

THE WORK OF THE U. S. COAST AND GEODETIC SURVEY IN THE PHILIPPINE ISLANDS

HOWARD S. RAPPEYE
Computer, U. S. C. & G. Survey

A semi-technical article which will give the reader a good idea of the work accomplished by the U. S. Coast and Geodetic Survey in the Philippines and the difficulties encountered while accomplishing that work

At the close of the Spanish-American War the United States found itself in possession of a new and altogether interesting piece of territory. People in the United States had, of course, known in a hazy sort of way that there was such a place as the Philippine Islands but as for knowing anything in detail about them; that was an entirely different matter. After the close of the war the American Forces in the Philippines were kept extremely busy in quelling the insurrection, and, as military operations were extended throughout the Islands it was forcefully brought to the attention of those in authority how very little we really knew about the Philippines.

Such charts as the Spanish had made were not to be relied upon to any great extent, having been more or less carelessly prepared with little or no control except an occasional astronomic location of no great pretense to accuracy. And in most cases, even where the charts had been fairly well prepared in the first place, no revision had been attempted and they were badly out of date. No maps were available of the interior portions of any of the islands except a few very crude maps, of hardly the quality of a fair reconnaissance.

It was realized early in the history of the American Occupation, that surveys were needed and those right quickly. The Coast and Geodetic Survey detailed an officer, during 1900, to make an investigation of conditions in the Philippines relative to existing charts and maps, needed surveys, suitable ships and equipment, and to make recommendations regarding the establishment of a field station of the U. S. Coast and Geodetic Survey in the Philippines and the prosecution of topographic and hydrographic surveys.

In December, 1900, the first party arrived at Manila and, after conferring with the Military and Naval Authorities and the Philippine Commission, an office was established in the Intendencia Building on the south bank of the Pasig River at Manila and the work of surveying the Philippines was begun.

Owing to the conditions then existing in the Islands it was deemed necessary to abandon the ideal method of surveying a new area. The military authorities were in immediate need of surveys of harbors and

anchorage at the principal ports throughout the Islands in order that transports might, with less difficulty, keep the troops supplied with the food and munitions needed in their operations against the lawless tribes in the outlying provinces. Also owing to the unsettled political state of the Islands and the many localities in which it was unsafe for a survey party to go very far inland, without a heavy military escort, it was hardly possible to extend a triangulation scheme over the Islands in advance of the first topographic and hydrographic surveys.

The work was begun in a number of localities at once, where surveys were most urgently needed. Each individual survey was based on an astronomic location and azimuth together with a local scheme of triangulation of tertiary character for the immediate control of the locality to be surveyed. The results of these harbor surveys were hastily prepared in the office at Manila and harbor charts were published as rapidly as possible, in order that they might be available for navigators and the military authorities at the earliest possible moment.

Gradually, as the immediate need for harbor charts were satisfied and the condition of the Islands became more settled, making it no longer necessary to remain close to the shore, except in the Moro Country and perhaps in some parts of Northern Luzon, it became possible to plan and execute connected schemes of triangulation and to extend systematic surveys along the coasts of the various islands. Also by means of high interior triangulation points and large figures it was possible to connect most of the islands with a continuous triangulation net of a very fair degree of accuracy.

As this trigonometrical control was extended over the archipelago it naturally connected now and then with the local triangulation schemes, each one of which was based on its own astronomic location, and trouble ensued. Not just mere trifling discrepancies that might be adjusted, but real, life sized discrepancies that often necessitated serious warping of shore line near the borders of charts in order to make them fit those of adjacent areas.

In a region such as the Philippine Islands, where deep sea and high mountains alternate rapidly in

every direction, large and erratic deflections of the vertical are to be expected and it was found upon connecting these detached schemes of triangulation that grand and glorious confusion would result unless some one datum was adopted for computing geodetic positions throughout the Islands. The computing division of the Manila Field Station undertook an extensive study of the deflections of the vertical with a view to deriving a fundamental position from which adjusted triangulation could be computed. At the time this study was undertaken there were but 19 of the 39 astronomic stations already established which had been connected into a single continuous scheme of triangulation. It was desirable not only that the adopted fundamental position be the best that could be derived from the data then at hand but also so established that, as the work was extended over the Visayan Islands, the adopted position would serve as a datum for this extended area with a minimum of distortion. The position derived from this investigation and adopted, after nearly three years of study, defines what is now known as the Luzon Datum.

Later as connections were made with the triangulation schemes in the Visayas it was found that the predictions as to the behavior of the vertical in the southern islands had been so close to the actual conditions afterwards encountered, that positions computed on the Luzon Datum could be accepted as fixed, for all practical purposes. Later when the work is finished the Luzon Datum can probably be adopted as the final datum for positions throughout the Philippines and as, such, it will probably differ from the best datum that could be derived, from a consideration of all 39 astronomic stations, by only a very slight amount.

The methods used by the Coast and Geodetic survey in the Philippines are in general the same as those used by the same organization in the United States and it is not so much in methods used as in conditions encountered that the work of the survey in the Philippines is different from similar work in the States.

Base lines were measured at first with steel and later with invar tapes. The tape is supported on stakes, tension applied with spring balance, and temperatures are read at each end of the tape every time it is applied in measuring the base. Large set-ups and set-backs are measured with a pocket steel tape while small ones are measured with a pair of dividers and a quarter-meter scale. Tape lengths are marked on metal strips fastened to the tops of the stakes. Levels are run over the stakes and corrections are made for grade and for elevation above sea level, though in the case of most bases in the Philippines, they were measured near the shore and at such a slight elevation above sea level that the correction to reduce them to sea level is a negligible quantity.

Triangulation, for the most part, is executed with repeating theodolites though in some of the more important, and main scheme figures a direction instrument was used. The direction instruments were equipped with micrometer microscopes reading to two seconds of arc on a ten inch limb while the repeating theodolites have seven inch circles and read by vernier to ten seconds of arc.

Signals are built of the material closest at hand and as a result are of widely varying character. The presence of heavy forests, on most of the peaks used for stations, often necessitates the erection of tall scaffolds for both instrument and observer. In cases where tall scaffolds are not feasible it often happens that a large amount of clearing has to be done in order to open sight lines to the other stations in the scheme.

The length of the lines used in the triangulation of the Philippine Islands does not equal the length of lines used in some parts of the United States. Lines of sixty miles are not uncommon however, and the maximum is around ninety miles. When one considers the fact that in the tropics poor observing conditions, such as haze, heavy rain squalls, and "boiling" atmosphere are almost continually encountered, the observation of long lines is a much more difficult feat than the observing of lines of equal length in the western part of the U. S., where conditions are almost ideal for this class of work. It has, at times, been found difficult to observe lines 80 miles in length in some parts of the archipelago even though heliotropes having mirrors eight inches square were used. The ordinary gas-pipe heliotrope with a two inch mirror will often fail to get the light through the haze on a 25 mile line.

The difficulty of travelling over land in the dense tropical jungle and under the heat of the torrid zone makes progress on main scheme triangulation slow and costly. A number of cases are on record where parties have been delayed on trips into the interior and have suffered considerable hardship as a result of the shortage of food and the difficulty of obtaining suitable drinking water. The climbing of a four or five thousand foot peak in the tropics is a very different proposition than one encounters in attaining the same elevation in the temperate zone.

In addition to the main scheme triangulation, which is executed as fundamental control, over the large area of the archipelago, a great deal of tertiary triangulation is needed for the immediate control of topographic and hydrographic surveys. In this work the repeating theodolite is used and usually one or two sets of "six direct and six reversed" are considered sufficient for the determination of an angle. The lines are usually short and are observed on the signals which are used for the hydrographic signals. Many natural objects such as off-lying rocks, tangents to small islands, lone trees,

mountain peaks, etc., are cut in and used as signals for hydrographic work.

The topographic work done by the Coast and Geodetic Survey, in its work in the Philippines covers as a rule, a very thin belt along the coasts of the islands. The plane table is used on nearly all of the topographical work and the methods used are the same as those on similar work in the States. It is almost entirely due to the extreme difficulties under which plane table work is carried on in the Philippines that it has acquired the bad reputation for being a "dog's life" which it has.

The greatest single obstacle to topographic work in the Islands is the mangrove swamp. To those who have never seen a mangrove swamp or have never tried to travel through one, the best way that I can describe it is somewhat as follows:—Imagine a thick and scraggly stand of scrubby timber, with as many roots exposed to trip over as there are branches exposed to knock off your hat, the whole standing in from a few inches to a few feet of salt water; completely infesting the whole area with millions of ravenous mosquitos and other small but unfriendly insects and an occasional poisonous snake; heat the whole affair up to the temperature of a railroad yard in August and then eliminate any possibility of a breeze and you will have a fair start toward an understanding of a mangrove swamp.

Mosquitos and ants make plane table work in the Islands a bad job at best. Many times a sheet will get soaked with salt water in making a landing from a small boat in the surf. It is extremely difficult to keep a sheet clean enough to be legible when every time the alidade is moved it crushes a mosquito or an ant and when the plane table man is up to his waist in water and sweating like a butcher above the water line. A stretch of good hard sand beach after a few miles of mangrove and coral reefs "looks like money from home."

One class of topographic work which has been executed in the Philippines is enough out of the ordinary to deserve special mention. Owing to the difficulty of carrying on topographic surveys in the unsettled, jungle covered regions in the interior of the islands ordinary methods would be too expensive in locating and contouring the interior mountain peaks which are visible from the sea, for charting as landmarks for the navigator. These peaks therefore are cut in either by triangulation or with the plane table, elevations are obtained by means of vertical angles from plane table stations along shore and on off-lying islands. Supplementary points are then cut in with the sextant from a small boat anchored out on a shoal or from the deck of a ship steaming slowly up and down the coast, two angles being taken for location by two observers and a third as a cut to a new point taken simultaneously by a third observer.

Most of the sketching is done from a small boat

anchored out on a shoal or from stations on off-lying islands. This gives the topography near the summits with a fair degree of accuracy but the sketching becomes less and less dependable as the valley bottoms are reached. In as much as the peaks are the important features for chart construction and as most of this "long distance topography" only appears on charts on a scale of 1:100,000 or smaller, the method produces the desired results and at a cost which is many times lower than that for which the same work could be done by the ordinary methods of topographic surveying.

Hydrographic work rather naturally subdivides itself into the following classes of work: ship hydrography, launch hydrography and deep sea sounding, all of which are in some respects similar and yet each of which has its own special features.

In launch and ship hydrography locations are determined by sextant angles to three signals ashore and are plotted with the three-arm protractor. Special cases often require the use of a bearing and an angle or some other special means of making a location but for the most part the locations are all "three point fixes."

In launch hydrography soundings are taken, up to about ten fathoms with hand lead and line and in greater depths with a hand sounding machine. Launch work is done in harbors and channels, close along shore on the general coast line and in fact in any place of moderate depth which is not so exposed as to render launch work dangerous.

Ship hydrography is resorted to in areas where the depth is very great, or in comparatively shallow areas that are exposed. Sounding lines run with the launch are much less costly than those run with the ship so of course the launch is used wherever possible.

Owing to the much greater elevation of the sounding chair on a ship, soundings with the hand lead can be taken in much greater depths than are possible with a hand lead used from the launch. From the ship when soundings are of a depth too great to be taken with the hand lead, a steam driven sounding machine is used. Up and down casts are made when the ship is stopped for the sounding but in depths up to about 90 fathoms pressure tubes can be used and the soundings taken on the run, with a great increase in the number of soundings per day.

In extensive areas such as the Sulu Sea and in other areas where sounding has to be carried on out of sight of land, the location of the soundings has to be made by refined navigational methods. Sounding lines are run as traverses between points where three-point fixes can be obtained and a check on the work can be obtained by astronomic fixes on the sun or stars. The plotting and adjustment of a series of dead reckoning lines on which numerous astronomic locations have been obtained, is a process requiring a great deal of patience and good judge-

ment on the part of the draftsman. At the present time about one-half of the Sulu Sea has been covered by deep sea sounding lines, the lines and soundings being spaced about five miles each way. Depths of over 3000 fathoms have been obtained in the Sulu Sea. In this connection it might be of interest to note that the deepest sounding yet recorded anywhere in the world was obtained by the German surveying ship, *Planet*, about 45 miles off the east coast of Siargao Island in Lat., $9^{\circ} 56' N$. The sounding was 5352 fathoms which is about 80 fathoms deeper than the Nero deep off Guam.

Tide gauges are established at localities where soundings are being made and furnish the necessary data for reducing the soundings to the plane of reference used on the published charts. On all Philippine charts the datum to which all soundings are reduced is mean lower low water. Automatic tide gauges, which give a continuous record of the height of the water surface, are used at the more important tide stations and staff gauges supplement the automatic gauges in less important areas and in the outlying portions of areas being controlled by an automatic gauge where variation in either the time or height of the tide might be suspected.

Current and magnetic observations are made during the progress of the work wherever possible and these furnish the necessary data for putting the compass roses and current arrows on the charts when published.

Early in the period of the beginning of extensive, connected surveys in the Philippines the U. S. Coast and Geodetic Survey Steamer, *Pathfinder*, was sent to the Philippines for use in the work there. She was originally built for work in Alaska, but had, prior to her coming to the Philippines, been used in the work of the Survey in Hawaii. The Philippines Commission provided the necessary funds for the construction of another ship, the *Fathomer*, which was built at Hongkong and placed in service in 1905. The Insular Government also loaned to the Coast and Geodetic Survey, the *Romblon* and the *Marinduque*, which had been built for the Philippine Coast Guard Service. These four, together with a small steamer, the *Research*, and at times a number of chartered launches, made up the fleet of the Survey in Philippine waters. The *Pathfinder*, *Fathomer* and *Marinduque* are still in service but the *Research* and the *Romblon* have been turned back to the Insular Government. The *Research* did excellent work while she was in service but the work that was suited to a ship of that size had been practically completed and she was turned back for lack of work for her to do. The *Romblon*, sister ship to the *Marinduque*, was turned back for lack of officers available for assignment to duty in the Philippines.

During the first years following the commencement of surveying work in the Philippines the organization grew rapidly and the amount of work accom-

plished was large. The field work accomplished to date has practically covered the archipelago with the following exceptions:—The Sulu Archipelago and the southern half of the Sulu Sea, the west coast of Palawan, part of the southeast coast of Mindanao and the east coast of northern Luzon together with the islands between Luzon and Formosa.

Up until the beginning of the war in 1917 progress in the Philippines was rapid, but, owing to numerous transfers to the army and navy during the war, and a badly depleted field force since the war, progress since 1917 has been relatively low. Only three ships are now being operated instead of five ships and some chartered launches, as before. Also due to the fact that the work remaining to be done is in the more inaccessible regions of the archipelago, the progress toward the end of the work naturally would tend to slow up to some extent. The difficulty of obtaining coal for the ships without long runs to and fro between the working ground and the coaling station, operates to delay the work.

In the office of the Survey, in Manila, the work is divided among six divisions: administrative, property and accounts, nautical, drafting, geographical and computing. As the last three are the ones of interest to the readers of the *CIVIL ENGINEER* they will be covered at the expense of the others.

The computing division has charge of all field records excepting original sheets. These records are received, indexed and filed until such time as they can be taken up for computation. The sounding records, after the tide gauge rolls have been reduced and the necessary computations made, are gone over and the soundings reduced to the plane of reference. They are then ready for placing on the fair hydrographic sheets and from these they are transferred to the compiled drawings for charts.

Triangulation records are subjected to a check in the matter of taking out means and the field abstracts of angles and lists of directions are made a part of the final computation wherever possible. Often, however, combinations have to be affected, and this necessitates station adjustments, with the result that new abstracts and lists have to be prepared. The triangulation is adjusted by the method of least squares and the final positions are computed on the Luzon Datum. Owing to the extremely large number of circuit closures in the triangulation of the Philippines, adjustments are usually rather complicated and often some very unique problems are encountered. It sometimes happens that considerable areas of badly interlaced figures must be adjusted, with the result that many of the adjustments are extremely "heavy."

In the drafting division, fair sheets are plotted from the sounding records and compiled drawings are made for charts. Projections are made up and sent out to the field parties. Tracings of compiled charts are made up and in the past have been sent

(Continued on page XII)

SMALL SEWAGE DISPOSAL PLANT OPERATION

By LT. COMMANDER L. F. BELLINGER, '87

An article of a rather more technical nature dealing with the design and operation of a small sewerage system; something not covered in most text-books on the subject

A young engineer is often called on for a sewerage system design for a group of buildings, such as benevolent fraternity "Homes" state asylums, hospital groups, educational institutions, or large manufacturing establishments in isolated locations, miners' villages, large construction camps, etc. The arrangement of the piping system with sizes of pipe, etc., is treated of in many text books, and the disposition without treatment into running streams is usually assumed. At the present time it is an increasingly more frequent requirement that bathing beaches and shore lines be protected against nuisance, bathers protected against typhoid, and fish and oysters protected from infection. The accompanying report by W. P. McElligott, now Lieutenant Junior Grade, U. S. N. R. F., inactive, will be of considerable assistance to anyone who has to solve any of the foregoing problems, because the plant described has been operated practically for three years, with the personnel served by the plant varying from 2500 maximum down to 200 or 300 men. The same plant could handle twice the maximum given with no additional attendance required.

The Naval Training Camp with the Hospital, was designed for a total of about 2500 men. It consists of over 130 buildings distributed over an area of about 40 acres, exclusive of drill field and athletic field. The outfall from the disposal plant is a 12" C. I. main, hung from piles on a pier about 1200 feet long extending into the Gulf of Mexico. Large schools of small fish thrived within a few feet of the outfall. Because of rowing, sailing, and swimming parties from the Camp, there was no attempt made to reach the lower limit of chemical efficiency by reducing the flow of hypochlorite at night. The largest orifice would flow less chemical in 16 hours than would offset the cost of an extra attendant. The purchase and use of one of the elaborate chlorine distributing machines was considered, but the results obtained by using ordinary wooden plugs, whittled by hand and inserted in all the orifices except the one in use, was considered a sufficient manual control so long as hypochlorite solution in excess of actual bacterial requirements was fed into the sewage. The cross baffles, the distributing apparatus such as the water closet tank with float valve, the orifice plate, wooden plugs, trough, and pipe leading the sewage inlet, were not parts of the

original design. The most important detail in application of chemical and removal of sludge was acquired when there was found and employed a negro who "hain't smelt nothin' foh ten yeahs." This attendant found it easiest to remove sludge by removing all clothing and getting down into the septic tank to do his shoveling. He was provided with a garden hose and nozzle for personal use.

The sludge was buried about two feet deep in a hole about 21½ feet square and then immediately covered over. The soil was sand. A space 20 ft. x 60 ft. was used, and when dug into after a year, it was found that all traces of sludge had disappeared and the original sandy surface was marked by a rich growth of grass. Immediate burial was considered safer than placing sludge in the sludge press, then transporting the pressed sludge through the Camp to the incinerator. The sludge press was used only a few days. The chemical mixing tanks of 2 inch thick wood were first coated with paraffin. When the calcium hypochlorite began to transform the wood into a white paper pulp where leaks started, a lead lining was installed. Constant stirring with a wood paddle wore out the lead lining in 1½ years, then a cement mortar lining two inches thick was installed and is now in use.

Owing to a letter, probably sent to all public works officers by a firm of explosives manufacturers, dated September 12, 1918 which letter at great length described the use of niter cake for recovering grease, and quoted a series of experiments using niter cake as a mosquito larvicide, it was concluded to attempt the use of niter cake in the sewage-disposal plant as a germicide, and A. B. Andrews, MM-2c(A), who in civil life was a chemist, was placed on this work. Information from the reclamation division of Camp Greene, Charlotte, N. C., dated November 25, 1918, states that the amount of grease recovered in the niter-cake process is very small, and that this method is used more for sanitary reasons than for the collection of grease. While the experiment was well under way, there appeared in the issue of Engineering News-Record of December 5, 1918, an article entitled "Promising Results with Miles Acid Process of Sewage Treatment in New Haven Tests." This article is a report which takes up the application of acid to sewage for the purpose of obtaining grease on a commercial scale, and gives the results of percentage of bacteria removed. The claim therein

made is that 91 per cent of samples showed less than 10,000 bacteria per cubic centimeter.

The object of these acid experiments was, first, to ascertain whether proper bacterial results could be obtained; second, to apply the acid to the grease trap in the main galley and obtain grease for soap. The large amount of soap had already been obtained for use in the galleys by the trying out of fat meat.

It will be noted in the detailed results that while less than 0.5 per cent of the bacteria remained in the effluent, the acid-forming bacteria were not killed by even the strongest solution used. The comparative cost of the processes is as follows:

Niter cake per million gallons of sewage, 867 pounds, at 4¾ cents per pound, earload lots--	\$41.18
Calcium hydrochlorite per millions gallons of sewage, 250 pounds, at 6¼ cents per pound, less than earload lots-----	16.87

This shows that the acid process is two and one-half times as costly as a disinfectant as the chlorine process using the equivalent of ten parts of chlorine per million, and that results, bacteriologically speaking, were not so good.

Improvements can be made in any plant. Those that have suggested themselves in this plant are:

- (a) For the work floor of reinforced concrete slab, substitute a removable wooden grating. It is too difficult to get a man under this slab with less than a foot clearance between sewage and bottom of slab to remove sludge, even when sense of smell is entirely lacking.
- (b) Building should be longer down stream from the "work floor" to provide more baffles, longer flow, and longer time of mixing of chemicals with sewage. This would be much more necessary in this plant were it not for the very long outfall sewer.
- (c) Sewer outlet should be at least 6 inches below the sewer inlet to provide a drop at entrance which would aid in mixing the entrance which would aid in mixing the sewage with the chemicals.
- (d) Several removable cross baffles of wood, or of wire mesh form a sludge destroying screen somewhat odorous, but they also serve to break up sludge mechanically, and hold sewage for a longer contact with the chlorine.

At the end of the outfall into the Gulf, the effluent was, except in very rare instances, entirely free from floating particles and was only slightly colored by the white hypochlorite. It was a satisfactory effluent from every point of view.

The Report of W. P. McElligott

U. S. Naval Training Camp,

Gulfport, Miss., February 19, 1919.

From: Ensign W. P. McElligott, U. S. N. R. F.

To: Lieut. Commander L. F. Bellinger, C. E. C.,
U. S. Navy.

Subject: Report on sewage disposal and purification at United States naval training Camp, Gulfport, Miss.

The sewerage system of the camp consists of two main trunk lines, one serving the latrines and wash-houses of the main camp and the greater part of the permanent buildings, the other serving the hospital unit. Both these lines are 10-inch vitrified tile. Wastes from the galleys are trapped through grease traps before discharging into the sewer. The grease traps are built of creosoted wood and are approximately 4 by 5 by 5 feet, which is ample in size to provide for a seven-day accumulation of grease. In this manner very little grease finds access to the sewer. For some time considerable difficulty was experienced on account of the sewers being choked up with sand. Large quantities of sand were also washed into the disposal plant, necessitating two cleanings of the sludge chamber each day. Investigation showed that the lines were originally laid in a stratum of quicksand and that the cement and oakum around the joints had washed away. In order to remedy this, 600 feet of the 10-inch line serving the hospital had to be recalked. A foundation of concrete 6 inches thick and 2 feet in width was put under this section of the sewer in order to give a stable foundation and insure permanent joints. A sand trap somewhat of the nature of a sump manhole was placed where the hospital line joined the main camp line and proved very effective in keeping the sewer free from sand. Especially after heavy rains large quantities of silt-like sand make their appearance on the pipes, but this is easily flushed out with a fire hose.

The disposal plant is nothing more or less than an ordinary septic tank. The sewage discharges into a sludge chamber, where it is treated with a solution of chloride of lime. A grating of steel bars prevents paper and solid matters from passing through the sludge chamber, where they are held until chemically disintegrated and precipitated. The effluent passes through the grating into the baffle chamber, where baffle walls reduce the velocity of flow and help in the precipitation of the lighter solids in solution.

Calcium hypochlorite is used in the disinfection, and from 95 to 99 per cent of the bacteria are destroyed. Approximately 250 pounds of calcium hypochlorite, or bleaching powder, as it is usually called, are used per million gallons of sewage.

A description of disposal-plant apparatus is contained in the following report of experiments carried out to find the effectiveness of sodium nitrate as a reagent in sewage disposal.

To investigate the possibility of the use of niter cake as a substitute for calcium hypochlorite for the disinfection of sewage from a military camp, a series of experiments was carried out at the naval training station at Gulfport, Miss. The experiments performed consisted of adding a known amount of a strong solution of the chemical to the flowing sewage and making bacterial counts on the raw sewage and on the effluent after treatment.

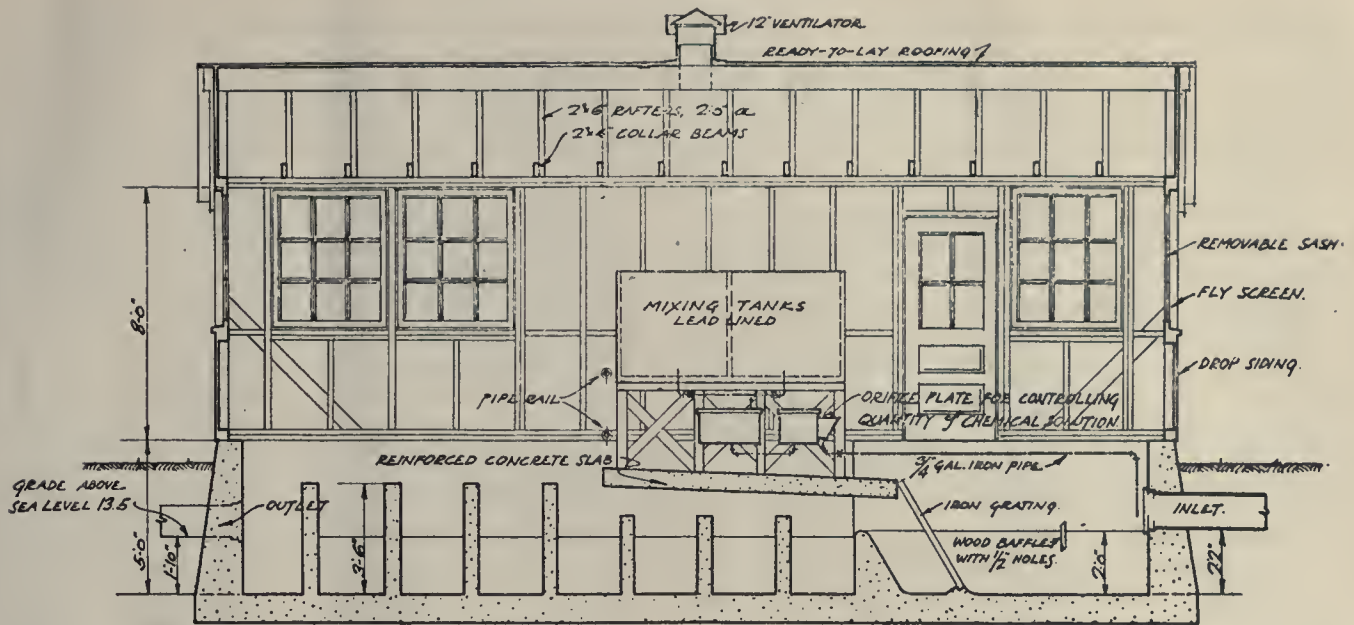


Fig. 1. Longitudinal Section of the disposal plant at the United States Naval Training Camp, Gulfport, Miss.

Description of Apparatus

The apparatus used consisted of two solution tanks of approximately 240 gallons capacity each, fitted with racks near their tops on which was placed the required charge of chemical. This was done to insure the more rapid dissolving of the niter cake, as it is a hard, compact mass, somewhat difficult of solution. These tanks were connected with suitable piping and valves in such a manner that either or both tanks might deliver a charge to the constant-head tank. This latter tank was supplied with a float valve, which kept the level of the contained solution constant, whatever the demand upon it. A pipe from this tank led to another tank, which was fitted with a metal plate having five orifices of different sizes. The head of these orifices was kept at 5 inches, and their flow was calibrated by measuring the discharge for 30 seconds in a graduated glass and calculating the amount to pounds or gallons per minute or other units, as given in Table 1.

TABLE 1.

Orifice No.	Cubic feet per second	Pounds per second	Gallons per minute	Pounds per minute
1	.00133	.0827	.625	5.00
2	.00082	.0509	.444	3.55
3	.00043	.0271	.204	1.63
4	.00047	.0293	.220	1.76
5	.00014	.0088	.066	.53

A collecting trough was suspended below the openings, and their discharge was led to the mouth of the main sewer, there to mix with the sewage.

The sewage at this point is of 12-inch vitrified tile pipe laid to a slope of 0.0038. The flow in gallons per minute for each inch in depth of the stream, measured at the middle of the pipe and calculated by Kutter's formula, follows in Table 2.

TABLE 2.

Depth	Gallons per minute
Inches	
1	30
2	70
3	150
4	270
5	415
6	566
7	740

On investigation it was found when the pipe was approximately half full with running sewage, that the depth of the stream became constant at a distance of a little less than the diameter of the pipe back from the mouth, and as the depth of the stream lessened, this distance shortened, so that measuring at least the diameter of the pipe back from the mouth gives correct results for the depth of the flowing stream.

The chemical used is a commercial by-product of the explosives industry, known as niter cake. It consists of a mixture of approximately 33 per cent free sulphuric acid (H_2SO_4) and 67 per cent of sodium acid sulphate ($NaHSO_4$) and results from the treatment of Chile salt-peter ($NaNO_3$) with sulphuric acid in the manufacture of nitric acid (HNO_3). During the present war niter cake has been produced in an unprecedented quantity and its disposal has become quite a problem to the manufacturer.

For the purpose of the experiments the flow at 8 o'clock in the morning was selected as the basis for calculation. This was done because the flow at this time was near a peak discharge, and if satisfactory results were secured at this time a large factor of safety was provided for the entire day. The strength of solution in the dosing tank was adjusted so that

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ALUMNI NOTES

'78. Professor Charles D. Marx of Leland Stanford University is Chairman of the San Francisco Engineering Council. Professor Marx is a Past President of the American Society of Civil Engineers.

'91. Professor William K. Hatt, formerly a member of the faculty of the College of Civil Engineering and now Professor of Civil Engineering and Director of the Materials Testing Laboratory at Purdue University, has been appointed Director of the new Advisory Board on Highway Research of the National Research Council.

'97. John C. Hoyt is President of the District of Columbia Section of the American Society of Civil Engineers and also a Director of the Society. Hoyt passed through Ithaca this summer on his way to his old home near Tully and while here secured registration blanks for his son Kendall who expects to take a C. E. degree in 1925.

'97. Ira W. McConnell, Vice-President of Dwight P. Robinson & Company, has gone to Brazil again on business in connection with some contracts for the construction of dams for the Brazilian government. McConnell is President of the Cornell Society of Engineers and a Director of the American Society of Civil Engineers.

'97. Norris M. Works is Secretary of the Milwaukee, Wis., Chapter of the American Association of Engineers.

'99. Harry W. Dennis is President of the Los Angeles Section of the American Society of Civil Engineers.

'00. Edgar J. Strassburger is President of the Butte, Mont., Chapter of the American Association of Engineers.

'01. Thomas Howard is in charge of the drafting room for the New York State Highway Commission at Watertown, New York.

'01. Nelson O. Tiffany is President and General Manager of the Masonic Life Association of Buffalo. His address is c/o the Association, Masonic Temple, Buffalo, N. Y.

'02. Jeremiah C. Finch has been appointed Secretary of the New York State Highway Commission with headquarters at Albany, N. Y. Finch has been with the state in the engineering department in various capacities since 1904 and was made Acting Secretary of the commission last February. On August 12th and 16th the commission let twenty-two contracts totaling about two million dollars.

'03. Don M. Rounds stopped off at Ithaca for a day or two recently for the first time since he graduated. Rounds has just returned from a trip to Europe on which he visited England, France, and Belgium.

'05. Captain Frank C. Tolles has been transferred from Associate Member to Member in the American Society of Civil Engineers. Tolles is President of the Akron, Ohio, Chapter of the American Association of Engineers.

'05. Harry F. Porter is acting general manager of the Upson-Walton Company, 1310 West Eleventh Street, Cleveland, O.

'05. The Location, Grading and Drainage of Highways, by Wilson G. Harger, Engineer with the N. Y. State Department of Highways, is reviewed in the issue of Engineering and Contracting for October 5th. This book is the first of a series of four volumes, which Harger expects to publish. He is also joint author with Mr. A. E. Bonney of the Highway Engineer's Handbook, a new edition of which appeared recently.

'06. George L. Bilderbeek has been transferred from Associate Member to Member in the American Society of Civil Engineers.

'06. M. C. E. '09. Grover C. Brown spent a few days in Ithaca recently while on his vacation. He is Assistant Chief Civil Engineer with the Cambria Steel Company at Johnstown, Pa.

'06. Nathan Schein is Secretary-Treasurer of the Pittsburgh Section of the American Society of Civil Engineers.

'07. Henry W. Maynard has a review of Factory Administration and Cost Accounts by Edward T. Elbourne in the October issue of Management Engineering.

'07. Clarence H. Swiek is Geodetic Computer with the United States Coast and Geodetic Survey. He lives at Capitol Heights, Md.

'07. Lieutenant Charles W. Linsley has been transferred from Associate Member to Member of the American Society of Civil Engineers.

'08. Lieutenant John H. Stevens is Assistant Engineer with the New York State Highway Commission at Watertown, N. Y.

ex '10. Edward M. Deering has been elected an Associate Member of the American Society of Civil Engineers. Deering is Assistant Engineer in the Bureau of Engineering at Yonkers, N. Y.

ex '10. Walter L. Drager is Secretary-Treasurer of the Colorado Section of the American Society of Civil Engineers. He is in the U. S. Reclamation Service at Denver, Colo.

'10. Howard F. Bronson is Secretary of the Harrisburg, Pa., Chapter of the American Association of Engineers. His address is 403 S. 13th St.

'10. Wilmer A. Dehuff, formerly associate professor of civil engineering at John Hopkins University, has been appointed principal of the Baltimore Poly-

technic Institute, of which he is a graduate.

'10. P. Z. Horton is Secretary of the Peoria, Ill. Chapter of the American Association of Engineers.

'10. Chung Chem Lo is Principal of the Tangshan Engineering College at Tangshan, China. This college forms part of the Chiao Tung University recently organized by the Ministry of Communications.

'10. Amos O. Nisenson has been elected an Associate Member of the American Society of Civil Engineers.

'11. Clarence P. Rhynns has changed his address from Claircrest, Pa. to 16 Forbus Street, Poughkeepsie, N. Y.

'12. Captain Matthew M. Bird has changed his address to 200 N. Willomet Avenue, Dallas, Tex.

'12. George A. Belden is Secretary of the chapter of the American Association of Engineers at Savannah, Ga.

'12. Peter Remsen is President of the Wilmington, Del., Chapter of the American Association of Engineers.

'12. Albert B. Clunan, Assistant Manager of Purchases for the J. G. White Corporation, has been elected an Associate Member of the American Society of Civil Engineers.

'12. Elmer G. Edwards is Highway Engineer with the Bureau of Public Roads, with offices at 410 Hamm Building, St. Paul, Minn.

'12. William J. Fulton has changed his address to c/o R. E. Taylor, Fortuna, North Dakota. Fulton is the author of "Area Tables for Highway Engineers" published in 1920, and of short articles on Highway location and design published this year.

ex '12. Rossiter M. McCrone is Division Engineer on the Royal Irrigation Works in Siam. He has recently been transferred from Associate Member to Member of the American Society of Civil Engineers.

'13. William E. Brooks is now with the Chaplin Construction Company, Morgantown, W. Va.

'13. M. C. E. '14. Nathan W. Dougherty is President of the Knoxville, Tenn., chapter of the American Association of Engineers.

'13. Granbery Miller is a member of the Drummond-Miller Company, General Contractors, 4500 Euclid Avenue, Cleveland, O.

'13. LeRoy Taylor is Senior Highway Engineer for the Bureau of Public Roads at Minneapolis, Minn. He has charge of Federal Aid Road Construction for the Bureau in the State of Wisconsin. His office is 410 Hamm Building, St. Paul, Minn, and he resides at 3529 Columbus Ave. Minneapolis, Minn.

'14. Robert J. Auld has been elected an Associate Member of the American Society of Civil Engineers.

'14. Paul L. Heslop has been transferred from Junior to Associate Member in the American Society of Civil Engineers.

'14. M. C. E. '15. Hool and Whitney's (Charles S. Whitney) Concrete Designer's Handbook is re-

viewed in the issue of Engineering and Contracting for September 28th.

'14. Miss Elizabeth Mason Heath and Van Wyck W. Loomis were married on September 17th. Loomis is a representative of the American Telephone and Telegraph Company in the Southwest.

'14. Charles Kirschner has been transferred from Junior to Associate Member in the American Society of Civil Engineers.

'14. Edward J. Mershon has been elected an Associate Member of the American Society of Civil Engineers.

M. C. E. '14. Henry R. Meyer has been elected an Associate Member of the American Society of Civil Engineers. Meyer is City Engineer for Havre, Montana.

'14. John M. Phillips has changed his address to 7 Clark Street, Lancaster, N. Y.

'16. The address of James J. Wall, Jr., is changed to 543 West End Avenue, New York City.

'16. Abram F. Bacharach has been appointed Instructor in the Department of Engineering at the Baltimore Polytechnic Institute.

'16. George D. Barnhart of Clayton, N. Y. is President of the Watertown N. Y. Chapter of the American Association of Engineers.

'16. Charles H. Olmstead, Division Engineer Tennessee State Highway Department, is editor of Tennessee Highways, a quarterly which made its appearance in October. Olmstead is also President of the Nashville, Tenn. Chapter of the American Association of Engineers.

'17. The appointment of John J. Gromfine to the Corps of Civil Engineers, U. S. Navy, has been confirmed by the United States Senate. Lieutenant Gromfine's home address is 845 Fillmore Avenue, Buffalo, N. Y.

'17. Charles H. Capen, Jr., Assistant Sanitary Engineer of the New Jersey State Department of Health, has an article on Testing and Calculating Aluminum Sulphate Solutions in the Engineering News-Record for October 6th.

'18. George H. S. McNair is at present engaged in making an exhaustive study of directory advertising. McNair is with the New York Telephone Company, 15 Dey Street, New York City.

'18. Lieutenant Alfred Mulliken, who was an Assistant Engineer in the old Division of Sanitary Engineering of the N. Y. State Department of Health, has been appointed Assistant Sanitarian in the new Division of Sanitation.

'19. Francis A. Haley is with the Maintenance of Way Department of the New York Central Railroad at Watertown, N. Y.

'19. M. C. E. '20. Mr. and Mrs. Harris Charles Norton have announced the marriage of their daughter, Ruth, to Mr. Percy Suydam Wilson on Saturday, the third of September, at Maple Terrace, Byron, N. Y. Mr. and Mrs. Wilson spent part of their honeymoon in Ithaca.



COLLEGE NOTES

FOOTBALL

Cornell 55
Rochester 0

In its second start of the 1921 season, the Cornell football team romped to an easy victory against the University of Rochester. By smashing thru the line of its opponent for 34 first downs, secured mostly by straight football, the Red and White clearly demonstrated its power as a wonderful football machine.

After but six minutes of play, the initial touchdown was registered, followed in rapid succession by two others, which gave the Cornellians a safe lead. Time and again the backs plowed through the Yellow and Blue line for gains of from five to fifteen yards. Excellent interference was given in every play, thus the Red and White showed that it had learned the game in every detail.

The game progressed with Cornell scoring almost at will. In the last quarter Coach Dobie sent in an entire new team and Rochester opened an attack by a series of forward passes which at times brought them to the shadow of our goal post, only to be checked at the critical moment by a stubborn defense.

A marked improvement over the unsteady playing of a week previous was noticeable. Too frequent fumbles and off-side penalties proved a serious detriment in the game against St. Bonaventure. With Rochester as an opponent, however, comparatively little ground was lost by erratic playing.

Cornell 110
Western Reserve 0.

Coach Gilmour Dobie's Red and White machine continued in its winning ways by smothering the representatives of Western Reserve in a one-sided game on October 15. By a brilliant combination of line plunging and end running, the lighter

Ohio eleven was forced to defeat under the score of 110 to 0. Not only did Cornell pile up one of the largest scores of the current season, but she also reaped the greatest harvest of points for a single game that any Red and White team has reaped in over twenty years.

From the first whistle, the Varsity took the offensive, and by a demonstration of coordination between the line and the backfield, long gains were made thru the opponent's line. Broken field running by Kaw, Pfann, and Gould, the latter entering the game in the second half, the crossbucks by Ramsey and the line plunging of Lechler proved too much for the Ohioans.

Within five minutes of play, the ball, carried by Ramsey, had already crossed the goal line. Several touchdowns followed in rapid succession, since the Cornell backs encountered little opposition in their steady tramp down the field. By the end of the first quarter, the score had already assumed a one-sided aspect, Cornell being credited with 28 points.

One of the outstanding features of Cornell's offensive was the excellent kicking of Hanson, Dodge and Carey. Captain Dodge, tackle, was at his best, sending the pigskin soaring high and far on every kick-off. Hanson successfully kicked 10 goals out of a possible 11 chances. Carey also did well, accounting for 4 goals in 5 attempts.

Long runs featured the contest. In the second period, Kaw squirmed through the entire Reserve defense for a run of 17 yards, and incidentally, a touchdown. Lechler intercepted a forward pass early in the second half, and after a run of 69 yards, was brought to earth on the 1 yard line, but on the next play, he tallied. Gould used his ability as a track man to good advantage by making frequent long runs around the ends for considerable gains. Oddly

enough, the same number of points were registered in each half. The second team, it proved, was just as effective as was the first array.

The consensus of opinion on the hill seems to indicate that undergraduates believe that Coach Dobie is building up a formidable eleven.

PROSPECTS FOR POLO

The prospects for developing a winning polo team at Cornell are beginning to look bright. Last year, through the efforts of Major T. J. J. Christian and Lieut. W. W. Barton, a beginning was made with much difficulty. At first only artillery horses and a few cavalry horses were available and their value, in teaching a group of green men, was anything but noteworthy. Very little equipment was available, but in spite of such handicaps a very creditable start was made. A team was developed to take part in the intercollegiate tournament with Yale, Harvard, Pennsylvania and Norwich Universities and games were also played at West Point. Later in the year a carload of polo ponies was received from the Port Royal Remount Station, but being young and untrained they were practically unavailable for use last year.

With a good sized group of candidates appearing for practice this year, prospects are rising fast. Polo is a game that requires plenty of room for practice and in this respect Cornell is well equipped. The new ponies, nineteen in number, were sired by some of the best stallions in the army remount department, many having very creditable track records. The ponies are being whipped into shape by the enlisted men of the R. O. T. C. in preparation for this year's work. Every morning they are used in practice games by men who have had enough experience at polo to insure proper handling of the new mounts. Several men are beginning to show very good form and are able to wield their mallets and clip the balls on the dead run like veterans of the turf. As a special incentive to the men showing up, it has been decided to assign four of the ponies as private mounts to the four men showing the best form and teamwork.

More men are still needed if the best results are to be had, but the great strides that polo is making at present are creating widespread interest and men who formerly knew but little about the game are becoming enthusiasts. With so little previous experience we cannot predict too much, but we do know that we have the material for a most creditable team and that polo is beginning to take a very noticeable place among our college sports.

'19. Reginald Waldo is engaged in stream gauging on the rivers of the State of Missouri and the Springs of the Ozark region. His address is Eighty and Olive Streets, Rolla, Mo.

In Memoriam

On October 13 Professor Alexander Gray, the well known writer, engineer, professor, and Director of the School of Electrical Engineering of the College of Engineering, died at his home on East Avenue after an illness of several months, which physicians were unable to diagnose.

Professor Gray was born in Scotland March 9, 1882. In 1904 he received his diploma in Engineering from the Heriot Watt College at Edinburgh, and a Bachelor of Science Degree in Engineering at the University of Edinburgh. Two years later he received the degree of Bachelor of Science from McGill University at Montreal, Canada. From 1897 to 1900 Professor Gray worked as a machinist and from 1900 to 1904 he worked as a draftsman and erection engineer, so that while in later life he spent most of his time in electrical work in the younger part of his life he was a Civil Engineer. In 1905 he entered the instructing staff of McGill University, where he served as an Assistant Professor in the Department of Electrical Engineering. In 1915 he came to Cornell as a Professor of Electrical Engineering, and when the Engineering College was reorganized, Professor Gray was made the Director of the School of Electrical Engineering. Professor Gray was a prolific writer and while he was only thirty-one years of age, he had become widely known. One of his text-books in particular is used in almost sixty technical departments and schools throughout the country.

Dean Kimball said that in Professor Gray's death the University had lost an able teacher, and that his many friends on the faculty had lost a genial companion; and that the loss of Prof. Gray would leave a place in the Engineering Faculty very hard to fill.

CHINESE AT HARVARD

On October 14th it was announced that arrangements had been made at Harvard to teach the Chinese language during the second semester of the present academic year. Dr. Yun Chao, who is a native of Shanghai, and a graduate of Cornell will have charge of the course. This is the first time in about forty years that Chinese has been offered at Harvard.

ALL CORNELL DANCES

The first of the series of All-Cornell Dances which will be conducted on the Hill this year to furnish a place for open dances upon the Hill, was held in the Old Armory on Saturday, October the Fifteenth. This is the second year that this series of dances has been running, their inauguration last year proving so successful and so popular that their retention this year was a thing almost a necessity. About three hundred couples attended the dance and a proverbial good time was had by all.

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INAUGURAL DAY

October 20, 1921, will go down as one of the most important days in the history of Cornell University. Amid the most brilliant array of educators, distinguished guests, intellectuals and delegates, Dr. Livingston Farrand was formally inaugurated as fourth President of Cornell University, in Bailey Hall. The Board of Trustees, having declared a University holiday, all other activities were suspended in honor of the inaugural, which was one of the most important academic events in the history of the University. More than one hundred colleges and universities of America and foreign countries were represented at the inaugural by their presidents or official delegates, in addition to the representatives of thirty alumni organizations and specially invited guests and friends of the University.

The inaugural ceremonies started at 9:45 in the morning when the inaugural procession, in academic costume formed in the court of Prudence Risley Hall, the temporary stopping place for delegates, representatives and visitors. The delegates, especially invited guests, the Deans, and the members of the Faculty marched across the Fall Creek bridge, passed in front of Sibley, White and McGraw Halls and were joined at Morrill Hall by the Board of Trustees, led by President Farrand and Acting President A. W. Smith, '78, Judge F. H. Hiscock, '75, Chairman of the Board of Trustees and Governor Nathan L. Miller, who took the head of the line. From Morrill Hall the procession marched up Presidents Avenue, north to Reservoir Avenue and thence east between the new Chemistry Building and Rockefeller Hall to the main entrance of Bailey Hall. The line of march from Morrill to Bailey Hall was flanked by members of the cadet corps of the University.

The inaugural exercises in Bailey Hall opened with an invocation by President Murray Bartlett of Hobart. Judge Hiscock delivered an introductory address. Acting President Albert W. Smith '78, delivered the seal and charter of the University to President Farrand, after which the official vestiture of office was bestowed upon Dr. Farrand by Judge

Hiscock. Doctor Farrand next delivered his inaugural address outlining his aims and probable future policy. Dean W. A. Hammond of the Cornell University Graduate School presented the greetings of the Faculty to President Farrand. The greetings of the Alumni of Cornell were next presented by Foster M. Coffin, '12, Alumni Representative. The official greetings of the colleges of the East, Middle West and West were next borne to the new president by President A. Lawrence Lowell of Harvard, President M. L. Burton of Michigan, and President R. L. Wilbur of Leland Stanford Junior, who acted as representatives for the colleges and Universities in their section of the country. A last minute message from President H. W. Chase of the University of North Carolina, who was to represent the South and present its greetings stated that he would be unable to attend the inauguration ceremonies. The last address was delivered by Governor Nathan L. Miller, who presented the greetings of the people of New York State to President Farrand. The exercises closed with the singing of Alma Mater.

In the afternoon, another important official ceremony took place, eclipsed only by the inaugural ceremonies of the morning. The laying of the cornerstone of the million and a half dollar Chemistry Laboratory disclosed the mystery which has surrounded the gift ever since its presentation to the University in 1919. The donor of the huge amount which will enable Cornell to have the best Chemistry Laboratory in the world for instruction purposes was Mr. George F. Baker, of New York City. Mr. Baker has been a generous benefactor to Cornell University. He donated the money for the first unit of the new and improved Baker Dormitories for men. Charles M. Schwab, trustee of Cornell University, accompanied Mr. Baker on his trip to Ithaca.

The exercises attending the laying of the cornerstone were held in Bailey Hall at 3 p. m., President Farrand presiding. Professor Quarles opened the ceremonies with an organ prelude after which President Farrand called upon Rev. President Rush Rees of the University of Rochester to pronounce the invocation. The introductory address was made by

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Edward Leamington Nichols, Professor of Physics, Emeritus. The main address of the afternoon, given by Edgar Fahs Smith, President of the American Chemical Society, was next on the program. Charles M. Schwab, member of the Board of Trustees, spoke next for the donor of the Chemistry Building, Mr. George F. Baker. Professor Louis Munroe Dennis, head of the Department of Chemistry, next described the contents of the copper box of records to be placed in the cornerstone and handed the box to Mr. Arthur Norman Gibb of Messrs. Gibb and Waltz, the architects of the Laboratory. A procession, similar to the one of the morning was formed and moved off the stage up the right aisle and out of Bailey Hall to the site of the new Chemistry Laboratory, where the persons officiating at the laying of the cornerstone mounted the platform. Mr. Gibb handed the box containing the records to Mr. Harold A. Ley of the firm of Fred T. Ley and Company, constructors of the Laboratory and Mr. Ley placed the box within the cornerstone, Mr. George F. Baker, the donor of the Chemical Laboratory laid the cornerstone. The ceremonies for the afternoon were closed with the playing of the evening song on the chimes.

When finished the new building will be the largest and most completely equipped laboratory of its kind in the world. It will be 272 feet long, 100 feet deep and five stories high. Incidentally, the building is

the most expensive of the University structures, costing \$1,500,000. No pains have been spared to make the new building complete in every detail. Professor L. M. Dennis and Mr. Gibb having traveled through all parts of the United States, visiting laboratories to obtain ideas for the interior design of the building. Two years will be required to complete the building and it will be ready for occupancy in September, 1923.

In the evening the ceremonies of inaugural day were brought to a close by the presidential banquet, held in the old armory. At 7:15 o'clock more than seven hundred honored guests attended the inaugural dinner given by the University trustees and members of the Faculty in honor of President and Mrs. Farrand. The banquet was easily the most brilliant social event held at Cornell since the semi-centennial. Following the dinner Judge Hiseock introduced as toastmaster Emeritus Professor T. F. Crane. The speakers of the evening were James R. Angell, President of Yale, Sir Robert Falconer, President of the University of Toronto, and Dr. Liberty Hyde Bailey, the well known author.

REGISTRATION

The first figures issued by the registrar's office indicated that the registration at Cornell for the College year 1921-22 has fallen off about 4,500, a decrease of

about 50 over the figures of December 1, 1920. The report of a second count by the registrar's office reveals that the number of students enrolled in the University has actually increased by 55 over the figures of December 1, 1920. At that time there were 4,960 students enrolled in the University, not including the New York Medical School. At the present time, according to the figures of Registrar D. F. Hoy, the total enrollment is 5,015, not including the medical students at New York, the number of which has remained about stationary.

The increase in registration is chiefly due to the enrollment of 45 more graduate students, 30 more students in the College of Engineering and 4 more students in the College of Architecture, which more than compensates for the decrease of 16 in the Arts College, and 4 each in the Colleges of Agriculture and Veterinary Medicine. The registration in the Medical College and College of Law has remained stationary.

The registration by colleges is as follows:

	Dec. 1, 1920	Oct. 1, 1921
Agriculture	1102	1098
Arts	1731	1715
Architecture	104	108
Engineering	1487	1517
Law	115	115
Medicine	25	25
Veterinary	76	72
Graduate School	340	385
Total	4960	5015

The above figures may vary somewhat owing to the possibility of late registration. It is expected, however, that the variation will not be appreciable and the above count, therefore, may be taken as fairly accurate.

From the table it is seen that there are 1517 students enrolled in the College of Engineering. This includes the students enrolled in the three Schools of Civil, Mechanical and Electrical Engineering. Since the members of the present Freshman Class in the Engineering College do not declare their intention of pursuing the Civil, Mechanical or Electrical Engineering curriculum until their Sophomore year, the number of students in each school do not include the members of the entering class. There are at present about 250 students in the School of Civil Engineering including only the Sophomore, Junior and Senior Classes.

SENIOR CLASS ELECTIONS

On Tuesday, Oct. 25, the elections of the officers of the Student Council occurred. D. B. Strickler was elected President of the Council and of the Senior Class. R. E. Brown was elected Secretary of the Council, and Life Secretary of the Class, while W. S. Dodge, captain of the football team, was elected treasurer of both class and council.

SHOP LIGHTING.

In an address delivered before the members of the Western Pennsylvania Division of the National Safety Council, Pittsburg, Pa., March, 1918, by C. W. Price, the importance of good lighting in industrial establishments was discussed, and the disadvantages of poor lighting were clearly shown by some figures mentioned by Mr. Price.

A large insurance company analyzed 91,000 accident reports, for the purpose of discovering the causes of these mishaps. It was found that 10% was directly traceable to inadequate lighting and in 13.8% the same cause was a contributory factor. The British Government in a report of the investigation of causes of accidents determined a close parallel to the findings of the insurance company above quoted. The British investigators found that by comparing the four winter months with the four summer months, there were 39.5% more men injured by stumbling and falling in winter than in summer.

Mr. John Calder, a pioneer in safety work, made an investigation of accident statistics covering 80,000 industrial plants. His analysis covered 700 accidental deaths, and of these 45% more occurred during the four winter months than during the four summer months.

Mr. C. L. Eschleman, in a paper published in the proceedings of the American Institute of Electrical Engineers several years ago, reported the result of an investigation of a large number of plants in which efficient lighting had been installed. He found that in such plants as steel mills, where the work is of a coarse nature, efficient lighting increased the total output 2%; in plants, such as textile mills and shoe factories, the output was increased 10%.

In an investigation of the causes of eye fatigue, made by the Industrial Commission of Wisconsin, it was found that in a large percentage of industries, such as shoe, clothing and textile factories, the lack of proper lighting (both natural and artificial) resulted in eye fatigue and loss of efficiency. At one knitting mill, where a girl was doing close work under improper lighting conditions, her efficiency dropped 50% every day during the hours from 2:30 to 5:30 P. M.

The above mentioned incidents indicate how important a factor lighting is in the operation of the industrial plant. It has been well said, "Light is a tool, which increases the efficiency of every tool in the plant." Glare or too much light is as harmful as not enough lighting, and in no case should the eyes of the workers be exposed to direct rays, either of sun or electric light.

Windows and reflectors should always be kept clean; that is, cleaning them at least once a week, for where dust and dirt are allowed to collect, efficiency of the light is decreased as much as 25%.

Good lighting, in addition to its other marked advantages, is a strong incentive towards keeping working places clean, for it clearly exposes any place where dirt or other material has been allowed to collect. White walls and clean windows glazed with Factrolite Glass will eliminate the sun glare and increase the illumination 25 to 50 feet from the window from 38% to 72% as compared with plain glass.

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No. 6.

THE GEODETIC SURVEY IN THE PHILIPPINES

(Continued from Page 22)

to the States for printing, but at present a new photolithographic plant is being built at the Manila office and in the future the printing will be done in the Philippines.

In the geographical division there is kept a list of geographical names throughout the Islands. Maps of all classes are gathered and filed. Geographic maps of the Islands on a scale of 1:200,000 are compiled from surveys by the Coast and Geodetic Survey, wherever these surveys have been made, and from the best available data otherwise. These are printed in colors and sold to the public at the cost of paper and printing. Also a map of the whole archipelago has been published on a scale of 1:1,000,000, in four sheets, suitable for mounting as a wall map. Mounting is done at the office of the survey and the cost of such work charged to the purchaser of the maps.

The personnel of the Coast and Geodetic Survey in the Philippines is supplied in various ways. The Director is a field officer of the U. S. Coast and Geodetic Survey and detailed from Washington to duty in the Philippines. Officers on the ships are all field officers detailed from Washington. The seamen, recorders, etc., on the ships are all natives, some paid by the Philippine Government and others by the U. S. Government. The chiefs of division in the Manila office are all U. S. Government employees sent out from the States while the natives in the office are mostly employees of the Insular Government; only a comparatively small number of them being paid by the U. S. Government.

The natives make very excellent draftsmen for tracing and routine work; time being absolutely of no account with them and apparently they have no nerves. Their smooth pen work is of wonderful neatness and beauty. The native computers do nearly all of the work of reducing soundings and compute triangles and positions but none of them, with one exception some years ago, have ever been able to master the work of making adjustments, even of single figures. Large adjustments are absolutely beyond them. In the ordinary routine work of the division they are extremely careful and painstaking and are wonderfully accurate in straight numerical work. As checkers for numerical work involving little or no reasoning, they are very good and apparently take a keen interest in making careful and accurate calculations.

The cost of the work in the Philippines is paid in part by the U. S. Government and in part by the Insular Government. The direction of the work and the custody of the records is all in the hands of the U. S. Government.

The Survey furnishes geodetic positions to the army, the Bureau of Lands, the Bureau of Forestry and the Bureau of Public Works, upon which, these organizations base detailed surveys in various parts

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of the archipelago. Much valuable data is also received from these organizations for use in compiling the charts and geographic maps of the Survey. The only really extensive detailed topographic maps of the interior of the Islands are those made by the army in Central Luzon on a scale of 1:63,360 and very similar to the maps put out by the U. S. Geological Survey in the States. Unfortunately these maps by the army are not available for general distribution.

Much of the work of the Coast and Geodetic Survey in the Philippines has been of an exploratory nature and in opening up the outlying portions of the island group for commerce the Survey has played a most important part. Often the field parties have undergone hardships of no light character. A spirit of loyalty to the Service and a willingness to be painstaking in all details has always characterized the personnel, with the result that the Survey stands high in the esteem of persons throughout the Islands who have occasion to make use of the results of its work.

The survey commenced in the early days of the American Occupation and has continued uninterruptedly ever since. First surveys are now about 75% completed and in addition to the regular work of the organization the Survey has done, or at least supervised, a great deal of work for other government bureaus.

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DESIGN OF SMALL SEWERAGE DISPOSAL PLANT

(Continued from page 25)

the flow through the largest orifice would add the proper amount of chemical for the expected flow of sewage at the time of sampling. At the actual time of sampling the real sewage flow was measured and the parts per million of chemical actually used was calculated. It was always nearly what was desired, owing to the constancy with which the flow of sewage persisted from day to day at the same hour of the day. This constancy is remarkable, and the flow can be predicted for a limited time with reasonable accuracy. When the flow is not near the average, it can be traced to some unusual circumstance, such as cleaning up for inspection, washing hammocks, etc. It is also noticed that peaks of discharge occur at practically the same hour each day. This in turn shows how a large group of men on the average perform the same operation at the same time every day.

Samples were taken at both the inlet of the raw sewage and at the outlet of the treated effluent. These samples were examined for their bacterial count, and special stress was laid upon the presence or absence of colon bacilli. Regardless of other bacilli, if the colon bacillus escapes the treatment, the process may be regarded as worthless from the sanitary point of view. The samples were secured at 6:15 a. m. and again at 8:20 a. m., the flow at these

two times being nearly in the ratio of 5 to 7. This operation gave two samples of different concentration each day. The lowest concentration of chemical in the effluent was 8 parts per million of niter cake and the highest concentration was 104 parts per million. The bacterial counts on the samples secured are shown in Table 3, following:

TABLE 3.

Date	Hour	Pounds of chemical	P. p. m.	Bacterial count	
				Inlet	Outlet
Dec. 10	8:20 a. m.----	42	8	9,000,000	2,000,000
	6:15 a. m.----	126	29	7,500,000	740,000
20	8:20 a. m.----	-----	22	7,500,000	1,331,000
	6:15 a. m.----	189	47	7,500,000	147,000
21	8:20 a. m.----	-----	35	7,500,000	268,000
	Samples spoiled	252	67	-----	-----
22	do	-----	48	-----	-----
	12 noon-----	546	104	-----	40,000

From the above, it appears that none of the effluent samples were satisfactory from the sanitary standpoint, viz, to contain not more than 10,000 bacteria per cubic centimeter and no colon bacilli. Apparently niter cake is useless, in any reasonable amounts, for the sterilization of sewage. During the addition of stronger solutions it was noticed that the sewage became markedly flocculated, and that large flocks of fat and fecal matter rose to the surface. This sticky, tarry matter might cause trouble



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in any practical working of the process by gumming up the screens and rakes. Another grave objection is that the large amount of free sulphuric acid makes the solution very corrosive to the tanks, pipes, and fittings, and causes complaint from the operators on account of destroyed clothing and shoes. During the addition of the strongest of the above solutions, 1-inch galvanized pipe and fittings were destroyed in 24 hours.

WILLIAM P. McELLIGOTT.

ALL FROSH OUT!

On the night of the seventeenth of October while most of the City of Ithaca was in darkness due to the burning out of a switch at the Ithaca Power House, with the engineer sick in bed so that no one competent to fix the switch could be immediately found, the cry so familiar to all the older men around the hill rang out for the first time this year. As in years gone by the Frosh answered the call, and appeared on the street clad in almost any or every variety of garment. As soon as '24 found out what was going on, they too organized and proceeded down town, under the impression that '25 was headed as of yore for the Dutch. The Frosh however had headed for their newest abhorration, the Totem Pole in front of the Old Armory, intent upon passing by without doffing their caps. The rear guard of '24 discovered this fact, and after executing a rapid and orderly "to the rear—Ma-a-eh" a la R. O. T. C., double or triple timed to the Frosh objective. In the mean time they dispatched a special

messenger on a motoreycle with orders for the Commander-in-Chief of the main army of the defenders to return at once, informing him of the enemies' new point of attack. The messenger delivered the message; the army returned up the Hill. In the mean time the noble six-hundred in the rear guard with Frosh to the right of them, Frosh to the left of them ripped well and tore well. The main army approached the field of battle and swept off all before them. Hemmed in on all sides the Frosh cause was hopeless, and they soon found out that all was lost, even their shirts and pants. And as Ike, the old clothes man, remarked the next morning in those well known words, "Ain't war what Sherman said?"

COLLEGE SOCCER

At the end of the first week of Intercollege soccer Agriculture stood first with a 1000 per cent average, having won one game and lost none. C. E., M. E., Chem, and Vet., are all tied for second place with one game won and one lost. Arts is in last place as they have lost their only game. The game C. E. has won was won from Vet with a score of two to nothing. The other game was dropped to M. E. one to nothing after the game had gone two extra periods because of tie score. In this game, C. E. played with but nine men on its team instead of the usual eleven due to lack of available material. We will leave it to the reader's imagination what might have happened if a few more men in the College had showed up on the scene, and we had had a full team.

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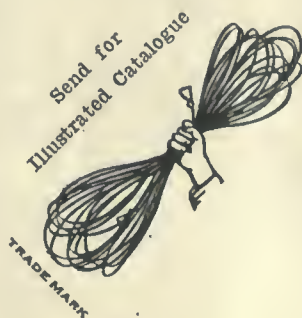
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DECEMBER, 1921

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Determination of the Effect of Ice on the Stage Discharge Relation. By Ralph J. Ferris '07..... 33

Mr. Ferris is an Assistant Engineer with the Pennsylvania Water Supply Commission. In this position he has been forced to find some way of dealing with the effect of ice on his stage discharge curves. In this article he discusses the effect the ice has on the curves and how he deals with it. He also touches on the general determination of the stage discharge curve, and how the values are checked.

Steel Mill Building Girts. By Arthur W. Engel '09..... 38

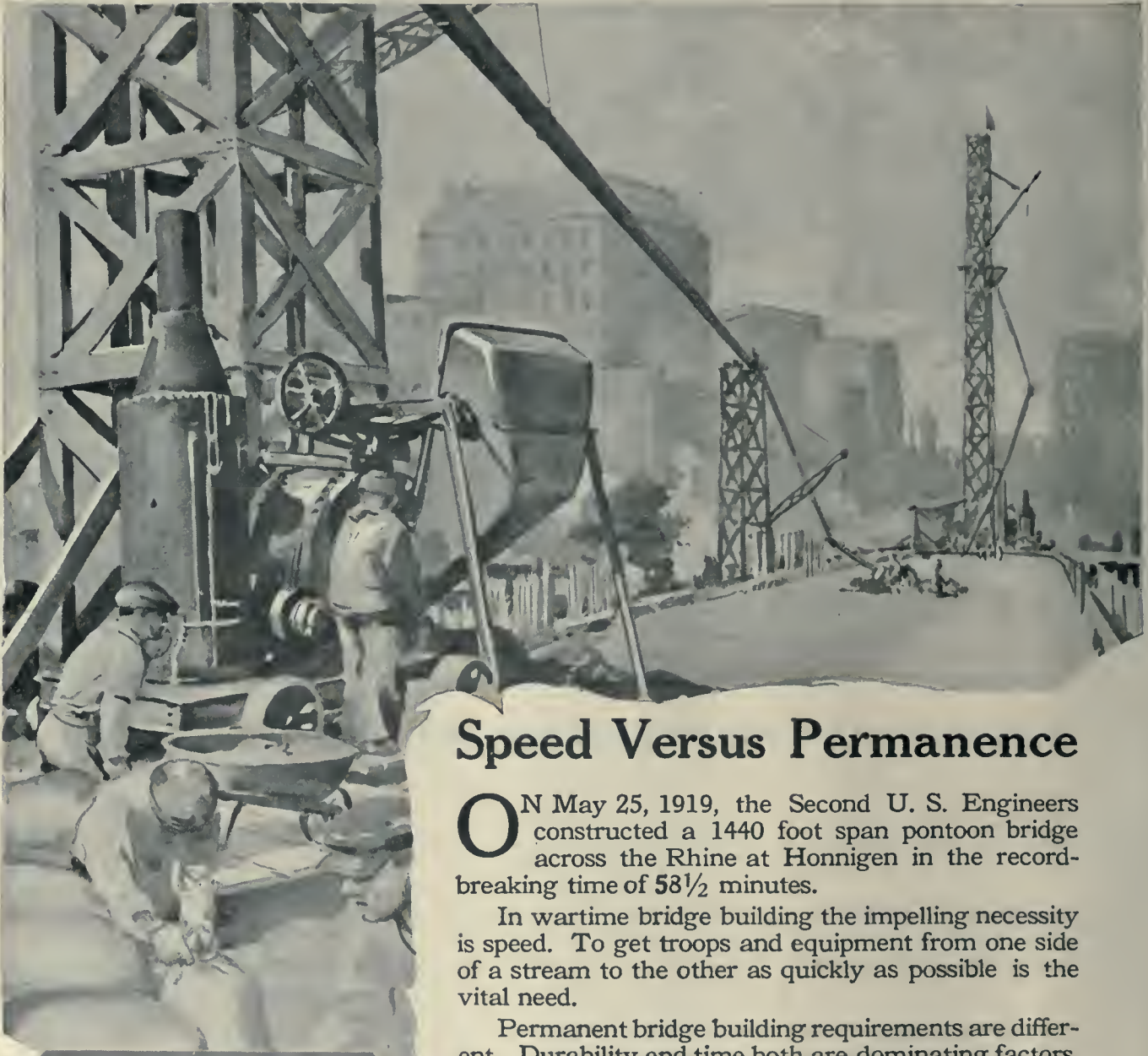
Mr. Engel is a steel designer with the American Bridge Company. In this position he has had charge of the design of many steel mill buildings. In this article he discusses briefly the design of girts and the specifications which should govern their design.

The Electrolytic Manufacture of Chlorine and Caustic Soda. By Clarence W. Marsh '94..... 39

Mr. Marsh is the inventor of the Marsh Electrolytic Cell. In this article he discusses the electrolytic manufacture of Chlorine and Caustic Soda, and tells of the advantages of this method of manufacture. This article should be of great interest to all water purification and sanitary engineers.

Alumni Notes 42

College Notes 44



Speed Versus Permanence

ON May 25, 1919, the Second U. S. Engineers constructed a 1440 foot span pontoon bridge across the Rhine at Honnigen in the record-breaking time of 58½ minutes.

In wartime bridge building the impelling necessity is speed. To get troops and equipment from one side of a stream to the other as quickly as possible is the vital need.

Permanent bridge building requirements are different. Durability and time both are dominating factors. Because the bridge must be substantial, safe, enduring, the reinforced concrete bridge most completely fills these requirements.

The Koehring Heavy Duty Construction Mixer is used in constructing these built-to-endure bridges in all parts of the country. Dominant Strength Concrete, 31 percent stronger than ordinary concrete, which is produced by the exclusive re-mixing action of the Koehring drum, guarantees the maximum safety and strength.



KOEHRING COMPANY

Manufacturers of Concrete Mixers and Locomotive Cranes.
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EDITORIALS

THE SIX-YEAR ENGINEERING COURSE

During the past summer while engineering students were enjoying a respite from the pursuit of their college courses their professors gathered at New Haven, Conn., and, at the Annual Meeting of the Society for the Promotion of Engineering Education discussed, among other things, the failings and shortcomings of the present standard four-year engineering course. Professor William H. Burr, formerly Professor of Civil Engineering in Columbia University, delivered a very interesting and exhaustive address before the Society in which he strongly argued for a system of engineering education wherein technical study would be preceded by three years of general college work. In other words, Professor Burr believes that the time has come for the elevating of the technical courses to a professional grade.

Every year, the leading engineering teachers, educators, and scholars in the country gather at the Annual Meeting of the Society for the Promotion of Engineering Education and agree that there is something fundamentally wrong with the present system of engineering education. There are many engineering students who feel the same way about it. The opinion of these students is not biased from contact with their professors but by their contact with men out in practical engineering work. Students who work on construction jobs during the summer come back in the fall and tell of their experiences. Quite frequently we have heard that so-and-so (the superintendent or the resident engineer or anyone connected with the job) gave forth the following advice to student engineers: "Study law, medicine, dentistry, etc., etc., in fact anything but civil engineering. There's no money in it." But, strange as it may seem a lawyer will tell you to study anything but law, a doctor anything but medicine and a dentist will impart the well-meaning advice that his profession is overcrowded and that there is no money in it. This anomaly is best explained and negated by the old adage "Familiarity breeds contempt" which is as true for the antagonism for one's profession and life work as it is of myriads of more trivial things. However,

be that as it may; if the advice which is so freely dispensed with in the engineering profession were followed ten years ago there would be no young and promising engineers today. But the average American boy's stubborn belief that there is "Plenty of room at the top" and that in the engineering profession he is offered the best opportunity for service to the community has made all this advice useless. It may even be that the student engineer refuses to believe that there is something wrong with the profession. We dare say that he thinks the trouble is with the engineer who so freely and profusely offers the advice. Perhaps he is right. However, if some of the engineers who are so bitter against the engineering profession had had a three-year college course as a back-ground for their technical training possibly they would have a better opportunity for success and consequently, be more satisfied with their profession.

Assuming that the six-year engineering course were introduced as the standard in this country it would bring with it several beneficial improvements not only in the student body but also in the profession. First, it would tend to eliminate the misfit from the engineering courses. There are entirely too many students in engineering courses today who are taking engineering courses just because they are four-year courses. These men do not like the idea, or perhaps cannot afford spending six years in college. As a result they will not take law or medicine which in most universities today are six or seven-year courses. Neither will they take a regular academic course (Arts) because they do not think it as useful as engineering. If the men are adapted for a technical training or can adapt themselves for one, no evil results. But, if they are not they become mere dawdlers throughout their college and professional careers. The six-year engineering course would eliminate a large percentage of this group. Second, the registration in engineering colleges would decrease and consequently, the numbers entering the profession would decrease thus tending to prevent overcrowding. The registration would be decreased not only by the decrease in the number of men taking the wrong course but also

by a decrease in the number who would embark upon a college career. These two beneficial improvements would come secondarily to the main benefit of a six-year course; i. e., giving the engineering student a more liberal education and producing better engineers.

In his address which is abstracted in *ENGINEERING NEWS-RECORD*, July 14, 1921, p. 65, Professor Burr presents both sides of the question in a masterly manner and then draws the conclusion that technical study should be preceded by a general arts course. But he neglected to discuss the effect which a six-year course would have on a man who is forced to work his way through college.

An argument frequently heard against the adoption of the six-year college course is that it is too hard on the student who is compelled to work his way through. Students in law and medicine which courses are six and seven years long have been known to work their way through without much complaint. One of our Alumni Correspondents in writing to us last year on this topic said, "Your objection to said six-year course must be reconsidered as it is not fair to let the pocketbook of the poorer students dictate the length of the college course." As a matter of fact, there are several students at Cornell today who are taking the optional six-year engineering course just because they do have to work their way through college. They find that it is very much easier to spend six years at the University instead of four when they are handicapped with the need of working their way through. Their school schedules, term by term, are lighter when they spend six years at college. The argument that a six-year course is too hard on the man who is forced to work his way is not as strong as it seems at first.

We quote again from the letter of Mr. Juan Aguilar, C. E. '08:

"The aim of all scientific schools, Cornell included, is to cram a boy with a lot of useless archaic stuff that limits his horizon to the four walls of an engineering office or to the tent of a construction camp. Modern life is so complex and varied that a man with such antiquated training will very seldom get to a high civic position, as he has no other ideas and aims in life than those found in Trautwine or in the *Mechanics of Engineering*.

"Let the engineer have a liberal education and he will surely enter other activities than those strictly connected with his chosen profession; and from a tool of financiers and law-makers he will convert himself to a leader of men. The transition curve is all right but its use is circumscribed to railroads, while good courses in civics, finances, sociology, and public speaking will open to the engineer many doors in public and private life that are now closed to those who still think that they can repeat with Monte Cristo 'The World is mine', by merely acquiring a college degree while missing a liberal education.

"It seems to me that the Cornell Engineering schools should engage in pioneer work for a liberal education for engineers either by adopting a six-year course or by requiring an academic degree of those entering said schools.

"We engineers are still traveling in stage coaches in these days of airplanes and wireless telegraphy, and it behooves us to wake up to the fact that times have changed, and proceed accordingly."

The six-year engineering course ought to be the standard technical course in all colleges and uni-

versities in this country. When it is finally adopted it will mark the greatest single advance that has ever been made in the history of engineering education.

THE SIGNIFICANCE OF MARKS

The undergraduate who has learned to carefully proportion his time between his studies and outside activities has indeed attained a much desired goal. To the underclassmen, freshmen particularly, the multiplicity of appeals for participation in the various competitions or athletics often present to him the wrong perspective of University life and make him lose sight of his real purpose here. This editorial is not written with any intention of criticizing or discouraging student activities. It is written merely for the purpose of encouraging those who do not take an honest interest in their scholastic work.

The purpose of a college education is the securing of a fundamental background of knowledge which will aid the student in forming accurate and concise opinions. Just how far do scholastic marks affect the future success of a student? Are they indicative of later prosperity? The answer is "No" and "Yes". The oft-repeated story of the youth who frittered away his time in college and then made such a mark for himself afterward may be cited here as an example. But many, nearly all, misinterpret this. It was not because of the low marks but in spite of them, that he was later successful. Or it may be that due to paternal devotion the son immediately steps into a responsible position regardless of his previous record.

The college years of a student are the habit-forming years of his life. In this respect then, marks are generally a valuable criterion of a man's ambition and energy. If he has formed the habit of earnest and conscientious work in his early life he will carry this trait throughout all his life. Statistics taken from a large number of college graduates have borne out the fact that in the majority of cases their successful career has been in direct proportion to their undergraduate grades. The report shows that of 392 distinguished engineers 46.4 per cent graduated in the highest fifth scholastically, 27.8% in the second fifth, 18.3 per cent in the third fifth, and 3.6 per cent in the fourth fifth, and 3.8 per cent in the lowest fifth. The basis of eminence was taken to be the holding of office, membership on important committees, and service as representatives of the large engineering societies as well as the completion of responsible enterprises. Whatever is worth while in this world is gained only by hard work and honest effort. There is no open sesame to success. We are not defending the student grind but we are trying to give the student who seriously realizes his important obligations as well as privileges while in college and makes the most of his opportunities, his just due. "What is worth doing is worth doing well."

DETERMINATION OF THE EFFECT OF ICE ON THE STAGE DISCHARGE RELATION

By RALPH J. FERRIS '07

Assistant Engineer, Pennsylvania Water Supply Comm.

Type of gage used, effects of ice, measurement, and sample notes and tables taken from actual field work.

At the present time one of the most serious problems before the engineer is the lack of sufficient water for domestic and industrial uses. With this thought in mind it is the belief of the writer that a brief outline of the methods used in the determination of the quantity of water flowing in a given stream would be of some benefit to the undergraduates and might contain a few facts of value to the alumni as well.

The determination of stream flow in open channels is usually made with a current meter, and having a sufficient number of measurements covering a wide range in stage a rating curve and table is made for each station.

Since the gage height or stage is the basic data upon which all records of stream flow are founded a general idea of the methods, apparatus, and computations necessary for their collection and reduction will be given. The selection of a proper discharge station is sometimes a difficult task. A typical station is one having a permanent control riffle at some distance below the gage. This control may be either a rock ledge, boulder, gravel or clay section or an artificial control may be constructed with the idea of permanence. The relation of stage to discharge will remain constant as long as there is no change in this control section and no changes take place at the discharge measuring section.

The Type of Gage

The type of gage used is of little moment as long as it is maintained at the same datum at all times. The simplest and probably the most permanent gage is of the staff type, which very seldom requires any adjustment. The chain gage, which is very commonly used, is subject to many variations, such as wear of links, temperature changes, liability of becoming loose and shifting in its position on the bridge, and, since they are usually attached near the center of a span, may be affected by the differences of temperature in the bridge itself. The gage should be tested by levels at least once each year, and all chain gages should be measured each time the station is visited by the hydrographer to keep an ac-

curate check on the amount of correction to be applied to the observed gage heights.

On ordinary streams it has been found sufficient to obtain two gage readings per day, one early in the morning and another late in the afternoon. The mean for the day being the arithmetical mean of the two observations, which is well within the limits of accuracy of the other data, except when a sudden change in stage occurs between the readings, or on a stream affected by mills or dams above the station. In the latter case the location of the station should be changed. In such cases a small hydrograph is drawn and the mean for the period computed by taking the four hour intervals from the graph extending from midnight to midnight or by inspection. A sample of the gage height notes and hydrograph is inserted to show how this is worked out in practice. See Fig. 1 and Table 1.

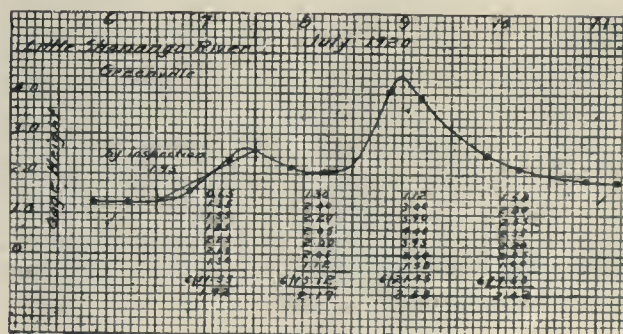


Fig. 1

A continuous monthly hydrograph is also drawn for each station on stream for purposes of comparison and any discrepancy between stations is checked as the gage height cards are received each week. When the daily mean gage height has been determined in the above manner it is tabulated on sheets and the corresponding discharge is entered opposite the gage height from the rating table.

The accuracy aimed at is not to allow the average error to exceed 2 per cent. This is taken care of in the rating table by using the discharge corresponding to the daily mean gage height as computed to hundredths until such a point is reached

in the table that the use of half-tenths does not cause an average error of more than 2 per cent. Then the half-tenths are used until the same condition is obtained regarding the use of the nearest tenth, and from this point the nearest tenth is used without exception.

Ice Effects

The methods outlined above are accurate and will give good results for streams having no ice cover throughout the year, but with the formation of ice in the northern streams the stage discharge relation must be modified. It is dependent upon the climatic conditions such as temperature, sunlight, precipitation and cloudiness. All of these factors must receive consideration in making the estimates of winter discharge.

The formation of ice begins with freezing temperatures and the back-water effect on the stage discharge relation is noticeable as soon as ice forms on the stream at the control. This ice may be in the form of sheet ice completely covering the stream for considerable distances above and below the gage. The depth of flotation of ice is approximately seven-eighths of the thickness, and one would think that the reduction in discharge would depend upon this thickness of ice cover, it is, however, of minor importance. The under surface of the ice becomes very rough and irregular, and it is impossible to make any accurate reduction from knowing the thickness of the ice alone. There are so many other factors of greater importance that the thickness of the ice cover is neglected except in the computation of the actual discharge measurements taken under ice cover.

Anchor ice, which forms on the bed of the stream during cold, dark nights, is released by bright light or a rising temperature and flows in suspension in the stream until it meets some obstruction such as a bar or island, when the slush begins to pack and jam reducing the area of cross section and producing an increase in gage height without passing any great quantity of water.

The formation of needle ice or frazil occurs in open water at low temperatures and, more readily, when the water is in agitation from wind action. This form of ice may be carried for considerable distances in suspension and will cause the same effects on the stage discharge relation as anchor ice.

A condition may occur, when the control will be free of ice with the stream at the gage under complete cover, when the free flow relation between gage height and discharge will apply, but this is a very unusual condition.

Any one or a combination of all of the forms of ice may occur at a gaging station during a winter period. Current meter measurements made under ice cover require more care and study than those taken during periods of free flow. The methods used and the results obtained from a series of discharge measurements made in the Ohio river drainage basin

during the severe winter of 1919-1920 will be outlined. About fifty discharge measurements were made under ice conditions, varying from a sheet of shore ice with open water between, to streams under complete ice cover both with and without floating anchor, needle and pack ice. The results showing a variation from 10 per cent to 90 per cent of the free flow discharge for the same gage height. An average of about 40 per cent for an entire winter period should not give results more than 10 per cent in error for a season such as the one just past.

Sample sheets of notes used for the observation and computation of the winter discharge are inserted to show the methods employed. In explanation of the special forms for the notes the following may be said: Table 2, p. 36, gives the date, stream name and location, the name of the hydrographer, a brief description of the conditions under which the measurement was made and a summary of the results obtained, saving considerable time in the office where the measurements are weighted, numbered, listed, and plotted. The headings of the columns of Table 3 will not need any further explanation, nor will the method of calculation, which is self evident.

Measurement

The equipment necessary for this winter work consists of a small Price current meter fitted with wading rods or a short cable and weight, an axe for cutting the openings in the ice, an ice chisel for trimming the hole after the water begins to flow in, which will be found to be a great help in keeping the operator dry during the operation of making the holes. A gage for measuring the thickness of the ice and a small shovel for removing the chipped ice and cleaning out the opening should be included with the other equipment. During extremely cold weather care must be taken to keep the meter under water to prevent freezing and retarding the revolutions. In some instances it is necessary to maintain a fire to keep the instrument in working condition.

The selection of a proper measurement section is a matter of judgment, and in general one should be selected which will give velocities great enough to turn the buckets of the meter and have a nearly uniform depth preferably a short distance above a riffle or section of open water. Such a section will generally give best results, because the anchor, needle or pack ice will be less apt to lodge if there is a section of open channel below the point of measurement. After the section has been selected the holes are laid out so as to give from ten to twenty vertical observations of the velocity of the water in the total width of the stream. The observations of the velocity are taken at two-tenths and eight-tenths of the effective depth at each hole wherever possible, if the two-tenths and eight-tenths observations can not be secured then the meter should be at

GAGE HEIGHT OBSERVATIONS ON LITTLE SHENANGO RIVER, GREENVILLE
Observations for Week Ending July 10, 1920

Day and Date	Water Height on Gage		Mean Gage Height		REMARKS
	Time	Gage Height	Obs.	Corr.*	
Sun	A. M.				
4	8:30	1.34	1.34		
	P. M.				
	4:30	1.33			Fair
	A. M.				
Mon.	8:30	1.31	1.30		
5	P. M.				
	4:30	1.30			Fair
	A. M.				
Tues.	8:15	1.30	1.30	✓	
6	P. M.				
	5:00	1.31			Cloudy & Rain
	A. M.				
Wed.	8:00	1.58	1.96	1.92	Hydrograph
7	P. M.				
	5:15	2.34			Cloudy & Rain
	A. M.				
Thurs.	8:30	2.15	2.08	2.19	Hydrograph
8	P. M.				
	5:00	2.01			Cloudy & Rain
	A. M.				
Fri.	8:15	4.05	3.98	3.58	Hydrograph
9	P. M.				
	4:30	3.90			Fair
	A. M.				
Sat.	8:30	2.46	2.30	2.42	Hydrograph
10	P. M.				
	4:30	2.15			Fair

(SEND regular CARD to-day.)

TABLE 1

six-tenths of the effective depth, if the water is shallow. The thickness of the ice, the distance from the actual water surface to the bottom of the ice, and the total depth of water are observed and recorded as shown on the specimen sheet. The gage height is always observed to the water surface. The effective depth is then computed and the measurement of the velocity of the water recorded in exactly the same manner as for free flow conditions. The time is observed to the nearest half second for a multiple of ten revolutions that will bring the time between forty and seventy seconds, which is best done by using a stop watch. The number of revolutions is applied to the meter rating table using the observed time to give the velocity of the water in feet per second. The remainder of the reduction is plain arithmetic, obtaining the mean velocity in each vertical and the mean in each section, which, multiplied by the area, gives the discharge of the stream.

It is self evident that a discharge measurement made under ice cover will always plot to the left of a free flow rating curve. It is the belief of many that a rating curve can be developed for streams affected by ice which will give average results for winter discharge, if a sufficient number of measure-

ments have been taken to determine the extremes of the variation.

It is recognized that the discharge measurement only gives the flow for the particular day upon which it was taken and, in fact, may not represent the true relation between gage height and discharge for that day, if the conditions are changing rapidly. The results are of great value, however, in determining the amount of the correction to be applied to the observed gage heights to reduce the discharge to the probable value, and, as the work progresses, a sufficient number of measurements will be obtained to determine a factor to be applied to each station which will reduce the office studies to a minimum.

At the present time the estimates of winter discharge are made as follows: A typical weather bureau station is selected for a group of gaging stations. The precipitation, maximum and minimum temperatures, and the freezing point are plotted for each day. The observed mean gage height, the discharge measurements, amount of the back water effect, and the notes on ice conditions, recorded by the field observation, are placed at the bottom of the sheet. From this sheet it can be determined by inspection whether a rise in stage is caused by pre-

DISCHARGE MEASUREMENT NOTES—ICE COVER

Date—February 17, 1920
Shenango River, near Jamestown, Pa.

No. of Meas.—10
Shenango River, near Jamestown, Pa.

DISCHARGE MEASUREMENT NOTES

Date....Feb. 17, 1920. No. of Meas.....10
Shenango River at Frye Bridge, near Jamestown, Pa.
Width 74 Area 86.2 Mean Vel. 120 Cor. M. G. H. 2.82
Party Buck & Doe Disch. 103
Staff gage, checked with level and found none
Chain length, checked with steel tape, 12lb. pull, found 19.04 ft.
“ “ changed to (not corrected) Correct length 19.05 ft.
“ “ corrected on basis of levels to.....ft. at.....o'clock

Gage reading	Time	Station	Meter No.	1874
2.91	3:00 P. M.	Top of ice	Date rated	11-14-18
2.81	3:00 P. M.	W. S.	Meas. began	3:30; ended 4:15
2.81	4:15 P. M.	W. S.	Time of meas. (hrs.)	.75 Method 2.68.8
.....	.....	.....	No. meas. see's	12 Coef. 1.00
.....	.....	.....	Av. width see	7' Av. depth 1.2
.....	.....	.....	G. Ht. change (total)	00
Weighted mean G. Ht. 2.81 ft.	.....	.....	40% diff. by 1920 rating table.	.....
Correct “ “ 2.82 ft.	.....	.....	.....	.....

Meas. from cable — stream side of bridge, boat, wading — ft. above below gage. If not at regular section note location and conditions. Through ice 200 feet above Gage: Area from soundings (date) 2-17-11

Method of suspension — Stay wire — Approx. dist. to W. S. —
Arrangement of weight and meter; top hole....; middle hole X; bottom hole...
Gage inspected, found in good condition. Cable inspected, found —
Distance apart of measuring points verified with steel tap and found —
Wind Strong upstr., Angle of current 90°

Observer seen Yes G. Ht. book inspected and found correct.
Examine station locality and report any abnormal conditions which might change relation of G. Ht. to disch., e. g., change of control; ice or debris on control; back water from; condition of station equipment. Occasionally slush ice gathers on control seriously affecting gage heights.
Sheet No. 1 of 2 sheets. If insufficient space, use back of sheet with reference letters.

TABLE 2

Dist. from initial point	Thickness of ice	Total Depth of Water	Effective Depth	VELOCITY				Area	Mean Depth	Width	Discharge
				At point	Mean in vertical	Mean in section					
0	Right	0	0	0	0	0		—	—	—	—
7	8	1.5	0.5	71	71	36	2.80	40	7	1.0	
14	6	1.4	0.5	104	104	88	5.95	85	7	5.2	
21	9	1.8	1.0	117	117	99	6.65	95	7	6.6	
28	5	2.0	1.3	128	128	110	9.10	130	7	10.0	
35	8	2.4	1.4	161	161	130	11.55	165	7	15.0	
42	8	1.7	1.3	169	169	150	10.50	150	7	15.8	
50	9	1.8	1.4	117	117	143	9.60	120	8	13.7	
57	8	2.2	1.5	157	157	127	9.10	130	7	11.6	
64	10	2.0	1.4	100	100	118	9.10	130	7	10.7	
71	10	2.4	1.6	136	136	116	9.45	135	7	11.0	
74	Left	0	0	128	128	99	2.40	80	3	2.0	
Total							86.20		74	103.0	

No....R.....of...R.....Sheets. Comp. by H.S.B.....Chk. by R.M.D..... Make notes on back.

TABLE 3

Mean Vel = 1.20

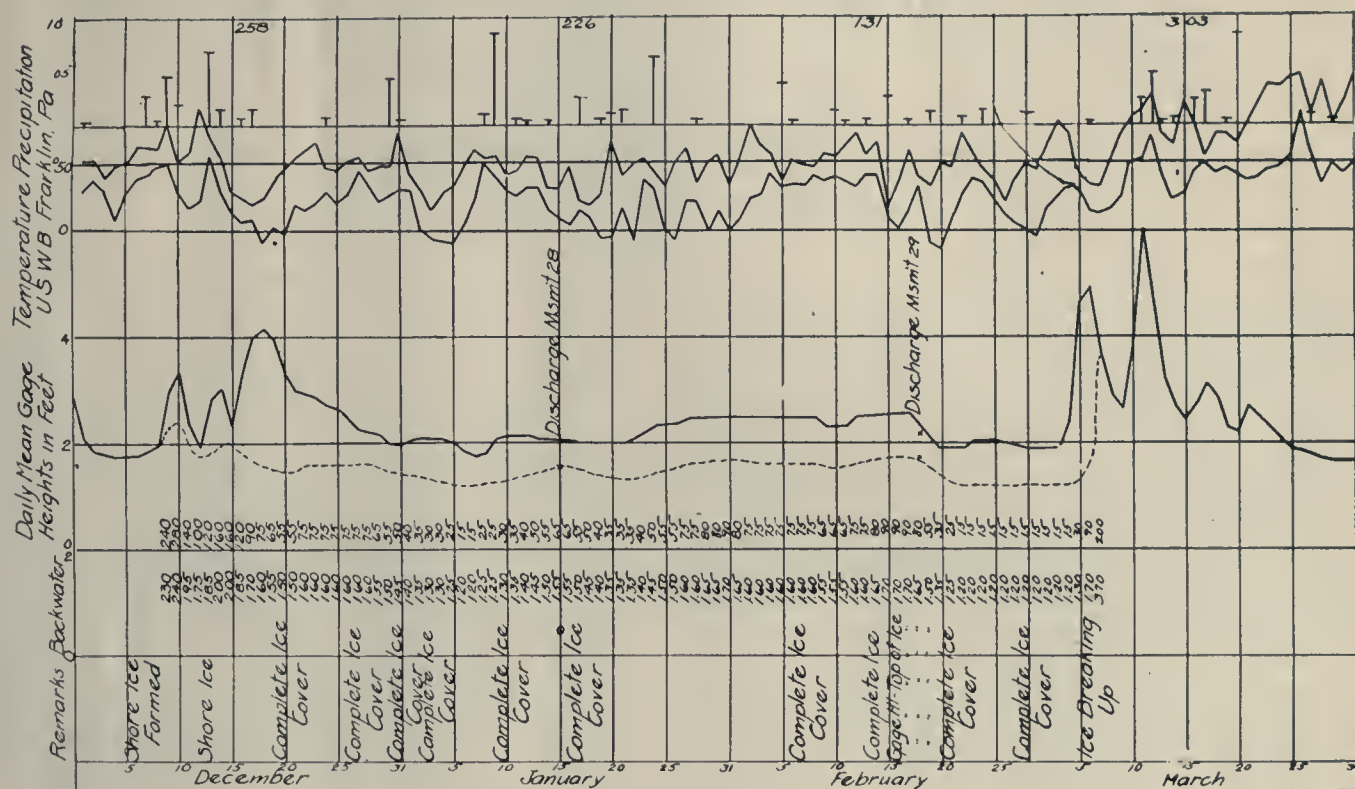


FIGURE 2

precipitation, melted snow or back water. Knowing the amount of back water on the days when discharge measurements were taken and having the other data noted above, a line representing the effective gage height is drawn and the discharge applied to this estimated stage from the rating table and listed as a preliminary quantity on the final daily mean gage height and discharge sheet. After all the stations in a drainage area have been compared to detect gross errors, the quantities are inked and filed for publication. The winter period is marked on the final sheet and the quantities are noted as estimated.

A very good check has been obtained on this method in the Shenango river drainage area above New Castle. On account of the use of the water for cooling purposes at Sharon and other steel centers, the river seldom freezes at Sharon or New Castle, which allows the use of a free flow rating for the entire year. There are above New Castle four gaging stations which are usually affected by ice, and, after making the winter estimates and determining the rate of run-off in second-feet per square mile, it is surprising to note the manner in which these stations check each other.

The tabulated results for the above stations are shown below.

TABLE 4.

Run-off in Second Feet per Square Mile				
Station	December	January	February	March
New Castle	1.130	0.385	0.477	3.640
Sharon	1.070	0.398	0.511	3.620
Orangeville	1.060	0.421	0.653	3.580
Greenville	1.010	0.431	0.521	3.690
Turnerville	1.020	0.333	0.532	4.170

Note:—The months of December and March are only affected for a portion of the period and New Castle and Sharon for only a few days during the entire four months.

With the ground frozen and the drainage area under a cover of snow the run-off relation in second-feet per square mile should show a closer comparison than for any other period of the year, and this fact is strikingly brought out in the table listed above when it is compared with a four-month period from May to September for the same stations.

TABLE 5.

Run-off in Second Feet per Square Mile					
Station	May	June	July	August	Sept.
New Castle	0.701	0.979	0.435	0.348	0.063
Sharon	0.581	0.851	0.373	0.758	0.092
Orangeville	0.618	1.190	0.384	0.635	0.089
Greenville	0.735	1.370	1.090	0.706	0.199
Turnerville	0.529	0.505	0.178	0.189	0.070

It is to be regretted that the work on the relation of rainfall to run-off has not progressed far enough as yet to allow a few words to be said along that line. It is hoped that the above notes will give some additional confidence to stream flow records, which do not seem to receive their proper consideration among engineers.

STEEL MILL BUILDING GIRTS

By A. W. ENGEL '09
Designer, American Bridge Company

Solution of two girt problems and tables showing sizes required according to specifications.

The duty of girts in a steel mill building is to carry the siding and the sash. The horizontal pressure caused by the wind is, however, the determining factor in most cases.

In his book on "Wind Stresses", Mr. R. Fleming says, "The girts are apparently the simplest portion of the building to design, but if observation and experience count they are the most difficult. Side and end girts of $3\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{4}$ or $5/16$ inch angles, 16 to 20 feet long and 5 feet apart, are still in use after 20 years' service, in defiance of all figures. Notwithstanding this, such designing practice is reprehensible."

Mr. Fleming proposes this specification:

"Girts are proportioned as beams supported at each end with a uniform horizontal load of 15 pounds per sq. ft.; an extreme fibre stress of 24,000 pounds per sq. in. is used."

Problem I.

Required the section of a girt for a building with corrugated steel siding, 20 foot bay lengths, girts spaced 5 feet apart, and one line of $\frac{5}{8}$ inch round sag rods per bay. Use above specification.

$5 \times 20 \times 15 = 1500$, the wind load in pounds.

$$\frac{1500 \times 20 \times 12}{8 \times 24,000} = 1.88, \text{ the section modulus required.}$$

A $5 \times 3 \times 5/16$ angle weighing 8.2 pounds per foot placed with the long leg horizontal has a section modulus of 1.9 in.³ and is the section required.

Ketchum's "Structural Engineers' Handbook" on page 56 gives this specification:

"Girts shall be designed for a normal load of not less than 25 pounds per sq. ft."

Problem II.

Using this specification and a unit stress of 20,000

pounds per sq. in. with data stated in Problem I, we get:

$$5 \times 20 \times 25 = 2500, \text{ the wind load.}$$

$$\frac{2500 \times 20 \times 12}{8 \times 20,000} = 3.75, \text{ the section modulus.}$$

A $6 \times 4 \times 7/16$ angle weighing 14.3 pounds per foot has a section modulus of 3.8 in.³.

An 8 in. — 13.75 lb. channel has a section modulus of 9.0 in.³ and as it weighs less than the $6 \times 4 \times 7/16$ angle, it is the section that should be used. The web thickness of a 6 inch or 7 inch channel of required strength is less than $\frac{1}{4}$ inch, the minimum allowed in most mill building specifications.

It may be noted that if we use this specification we obtain sections much heavier than permitted in practice.

Johnson, Bryan and Turneure's "Modern Framed Structures", Part Three, page 428, gives the following:

"The load to be carried by each girt is a vertical load due to the weight of siding and girt, and a horizontal load due to a wind pressure of 20 pounds per sq. ft."

Using this specification, we obtain a resultant moment making an angle with the horizontal. The use of section modulus polygons for angles, channels and other sections unsymmetrically loaded is explained in the appendix of Johnson, Bryan and Turneure's "Modern Framed Structures", Part Three. Where sag rods or sag bars are not used, girts should be designed by this method.

Channels when used as girts should be turned flanges down so dirt and moisture cannot collect in them. If conditions require them to be placed with flanges up, drain holes spaced about 3 feet apart should be provided.

TABLE 1.

Spacing of Girts	BAY LENGTH					
	14'-0"	16'-0"	18'-0"	20'-0"	22'-0"	24'-0"
3'-0"	$3 \times 2\frac{1}{2} \times \frac{1}{4}$	$3\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{4}$	$4 \times 3 \times \frac{1}{4}$	$4 \times 3 \times 5/16$	$5 \times 3 \times 5/16$	$5 \times 3 \times 5/16$
3'-6"	$3\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{4}$	$4 \times 3 \times \frac{1}{4}$	$4 \times 3 \times 5/16$	$5 \times 3 \times 5/16$	"	"
4'-0"	"	"	$4 \times 3\frac{1}{2} \times 5/16$	"	"	$6 \times 3\frac{1}{2} \times 5/16$
4'-6"	$4 \times 3 \times \frac{1}{4}$	$4 \times 3 \times 5/16$	$5 \times 3 \times 5/16$	"	$6 \times 3\frac{1}{2} \times 5/16$	"
5'-0"	"	"	"	"	"	"
5'-6"	$4 \times 3 \times 5/16$	$5 \times 3 \times 5/16$	"	$6 \times 3\frac{1}{2} \times 5/16$	"	$6 \times 3\frac{1}{2} \times 3/8$
6'-0"	"	"	"	"	$6 \times 3\frac{1}{2} \times 3/8$	"
6'-6"	"	"	$6 \times 3\frac{1}{2} \times 5/16$	"	"	$6 \times 3\frac{1}{2} \times 7/16$
7'-0"	$4 \times 3\frac{1}{2} \times 5/16$	"	"	"	"	$6 \times 4 \times 7/16$
7'-6"	$5 \times 3 \times 5/16$	"	"	$6 \times 3\frac{1}{2} \times 3/8$	$6 \times 3\frac{1}{2} \times 7/16$	$6 \times 4 \times \frac{1}{2}$

THE ELECTROLYTIC MANUFACTURE OF CHLORINE AND CAUSTIC SODA

By CLARENCE W. MARSH '94
Consulting Engineer

A discussion of the modern method of manufacture of chlorine and caustic soda.

The subject of this article is typical of industries using electrical energy for manufacturing chemicals. Engineers will be interested for this reason. Chlorine has become a recognized final disinfectant for water supplies and sewage effluent. Electrolytic manufacture is the modern way to produce Chlorine and the only commercially successful method. Caustic Soda is made with the Chlorine. Small plants will be installed at an increasing rate as the art is better understood and becomes common knowledge.

A third product, Hydrogen Gas, is made at the same time. The uses of hydrogen, usually termed a by-product or waste product, are becoming very important and make electrolytic manufacture of Chlorine and Caustic Soda more profitable.

The growth of the Chlorine and Caustic Soda industry is dependent on the extent of the future utilization of Chlorine. It has not been limited by the market for Caustic Soda in the past. Electrolytic Caustic Soda has taken care of only a small part of the constantly increasing demand for Caustic Soda. A steady growth of the electrolytic industry is probable, based on the past yearly increased consumption of Chlorine and its by-products.

There has been wonderful progress in the manufacture of products such as metals, alloys and chemicals through the use of electric power. First, because of the remarkable advance made in electrical machinery design during the past 20 years. Second, because the use of electric energy displaces manual labor and its increasing cost in manufacture. The direct production of chemicals by electric energy eliminates much labor. The electro-chemical industry is becoming a larger factor in the manufacture of pure metals and chemicals. Third, because of the higher standard of living, and outstanding characteristics of America, has resulted in an insistent demand by the consumer for quality.

It is probable that this tendency of growth will be an increasing one after the adjustment period following the war. The only limitation for a very rapid growth is the full utilization of Chlorine for the needs of the people and in industry.

Caustic Soda is in use in almost every trade. It has many and various applications. A mere statement of a few of these industries signifies its importance. It is one of the three or four most important heavy chemicals used in industry. Caustic Soda

is used in large quantities in the manufacture of soap, paper and pulp, and chemicals, drugs, paints, leather goods, enamel ware, cleaning agents, refining oils, metallurgy, mercerizing cotton, textiles, bleacheries, etc.

Chlorine and its by-products are extensively used in all kinds of activities and industries. At present, the actual tonnage is smaller but Chlorine is used in practically as many industries as Caustic Soda and in other lines as well. It is being used more for the final disinfection of water supplies and sewage effluent. Its largest use is for bleaching in paper, pulp and textile industries. In some form or other it is used in the following industries and trades: laundries, pharmaceuticals, tinning, silk mills, cotton, printing, rubber, for fire extinguishers, dry cleaning, chemicals, intermediates, dyes, paints, sugar refineries, photography, synthetic perfumes, chemicals, mineral and vegetable oils, explosives, match industries, preservatives, refrigeration, metallurgy, films, aeroplane dopes, phonographic records, etc.

The manufacture of Chlorine and Caustic Soda has been a specialized industry. Electric power is the largest item of cost. There are few sources of very cheap electric power within industrial regions. Furthermore many industries use only one of the three products made by the electro-chemical process. It has seemed to be the economic method to make these products as the source of cheap power and distribute the products to the consumer.

But the progress in electrical engineering for transmitting electrical current at long distances economically indicates that power from these cheap sources can be distributed over wider industrial areas. This will give power a broader outlet at a higher average price. The cost of electric power will become more uniform throughout the industrial regions. Then, in addition, many industries use two of the products and often all the products, including hydrogen, in the course of manufacture. Also, the transportation of the Caustic Soda, Chlorine and Hydrogen means a change of form for shipment which involves extra work and expense. Usually this marketable form must be changed back to its original state before it can be used.

Thus the electrolytic Caustic Soda, Chlorine and Hydrogen industry will become more distributed

throughout the country and the world. This makes the industry attractive to the engineer because it presents an opportunity.

Electrolytic departments will be of great importance and a necessary part of numerous self-contained manufacturing plants. If economic distribution of industry rather than over-specialization is sound, there will be a greater demand than ever for engineers to construct and control the operation of electrolytic plants.

Any widely distributed industry is bound to be a progressive one because it means competition. This should inspire engineers to give more attention to the electro-chemical methods of manufacturing all sorts of products. I should include in this electro-metallurgical processes. Electro-chemical methods of manufacturing will be the direct result of the almost universal use of electric power service now available in all parts of the world.

We will now consider some of the phases of manufacturing which may be of use in connection with your more detailed study of the processes.

The raw materials so called, for the electrolytic Caustic Soda, Chlorine and Hydrogen industry in order of costs are: power, salt, coal and lime.

Hydro electric power is usually the cheapest form of primary power which can be utilized to furnish the power. Central stations and hydro electric power plants are now being combined. Power will be available at more reasonable rates than have existed in the past under the same economic conditions. The war has caused a temporary up set in the business and industrial world but after an adjustment period normalcy will prevail. The electric power must be delivered in the form of direct current. A transformation is involved in the case of electric power supplied to the works in the form of alternating current. This loss must be taken into consideration in the final cost of power.

By the usual standards it takes 1 kw hr. to make 1 lb. of Chlorine, and 1 kw hr. to make 1 lb. of Caustic Soda or approximately 2 kw hr. for these two products. The cost at sources of cheap power under normal conditions will amount to one-third of the cost of the products in their raw or unfinished state. If the power is obtained in localities where reasonable but not the cheapest rates prevail the power item will amount to a half or more of the cost for the raw products. A modern electrolytic process using The Marsh Electrolytic Cell Batteries makes it practicable to reduce the consumption of power to $\frac{3}{4}$ kw hr. per lb. or approximately $1\frac{1}{2}$ kw hrs. for the two products.

It is essential, therefore, that in the use and generation of power low power rates be obtained. Low cost is a very important factor which the chemical engineer must have in mind. Of course this item should not be taken apart from other things. Other conditions may warrant even greater

attention. For instance, if the consumer can use these products in their raw finished state he avoids many of the costs involved in finishing the products for the market. These costs also include the shipping containers, the transportation and the retransformation of the products for use.

Salt is the next important item for consideration in the manufacture of electrolytic Caustic Soda, Chlorine and Hydrogen. The purity of the raw salt is an essential factor of its cost. The expense for purifying the brine made from salt of less purity than the best known New York rock salt will be an increasingly large item. Many mistakes have been made, especially during the past few years when conditions were not properly analyzed, in locating electro-chemical factories in the wrong place. In many cases it has been considered that any place with salt underlying the property or within a short distance was an ideal location. But the cost for purification has been so great that most of these companies bring in salt from long distances and at high rates for transportation. Under these conditions salt may be the heaviest item of expense.

Usually under the better conditions and during normal times, salt will count for about a third of the cost of the raw unfinished products.

The other items involved in electrolytic production, not including finishing the raw products for the market, are made up of labor and materials for renewals and repairs of the electrolytic equipment. In all the items of cost of manufacture I have not considered overhead such as interest, depreciation, administration, etc. Only items of manufacturing of the raw products exclusive of finishing in market form have been included.

It is at this point that a proper consideration be given to the kind of electrolytic apparatus for the plant. A thorough understanding of the electrolytic manufacture of Caustic Soda and Chlorine is necessary. This does not come about by a mere study of the theory but requires many years of actual experience in construction and operation of plants. The underlying principles may be understood but are not properly brought home in any other way.

We appreciate thoroughly what we gain by direct experience. Many years of actual experience in some line of chemical engineering must be had before one is properly equipped to pass judgment on any broad proposition in the chemical industry. Slow progress is not a sign of lack of success. In fact anything that is too rapid will be "unsound, uncertain, and disappointing."

The electrolytic cell equipment to be selected is bound up with economic location of the plant and the local conditions. High cost of power will call for equipment of the highest efficiency. This entails a larger expense than for apparatus of low efficiency.

In the end, equipment of high efficiency is almost invariably the best investment provided it is properly balanced with the other factors in chemical engineering design.

An electro-chemical plant located in any other place than at the point where cheap power is available has been regarded as impracticable. This is largely due to the fact that electrolytic cell equipment has been designed for cheap power. Moderate or even low power efficiency was considered good enough. This tended toward crude and bulky construction. The cells are of massive construction in order to resist deterioration due to the low power efficiency.

This rapid destruction is due to the wasted power occasioned by the low power efficiency. The extra amount of power used at a low cost for power seemed to be less than the added cost for repairs and renewals on account of the low power efficiency. Furthermore, with the designs that up to the present are available, the extra expense for floor space and for building cells of high efficiency was so great that it did not seem to warrant the extra cost for interest and amortization of high efficiency cells.

The future conditions seem to be exactly contrary to this tendency. In the first place electric power will be distributed over wider areas from central stations where power can be developed economically. The tendency will be to obtain a higher average price. All locations will be more or less on an equality, even those in the immediate vicinity where the power is developed. With a higher average price for power more attention will be paid to a correct design of electrolytic cells.

For many years I have been interested in decreasing the cost of production of Caustic Soda and Chlorine products through the use of better and more efficient electrolytic cell equipment. This has included the use of larger capacities in smaller units. In the case of the largest electro-chemical plant in the world which it was my privilege to have designed and constructed, it was necessary in the course of the development and enlargement to perfect the equipment in all departments. The most interesting development was a more perfect construction and design of electrolytic cells. The electrolytic cells were increased in capacity from 1200 amperes to 5000 amperes. The power efficiency was increased some 20%. The cells even though more than four times the capacity were less than double the size.

During the past few years I have developed electrolytic cells of the greatest importance to industry. Electrolytic Cell Batteries can now produce Caustic Soda and Chlorine at a lower cost than ever before due to the development of electrolytic cells of large capacity at high power efficiencies of 65% to 70%. The average which has prevailed under the best conditions heretofore has been 45%. These

new and perfected types are known as The Marsh Electrolytic Cell Batteries which are like storage batteries. They are simple, accessible, compact and of very high efficiency.

These cells are arranged with minimum spaces between them and are handled as a unit by mechanical overhead devices for all inspections, repairs and renewals. There is no necessity of dismantling the electrolytic cell to make renewals. Those cells are operated for a year at a time without renewals of any kind such as diaphragms and two years without renewals of graphite anodes.

Standard practice along the lines of past practice consist in arranging groups of units a few feet apart in order to gain access between the units for renewals and repairs or for attendance and inspection. Aisles are left between rows of units. The electrolytic cells are arranged on insulated piers a few inches above the floor line depending on the type. Cells are from 2 to 4 ft. high, and about 18 inches wide. Various types measure 8 to 17 feet long and are rectangular in shape. Others are circular in form and therefore more limited in capacity. Some cells can be renewed more easily than others. Other cells are built very cheaply and when so built naturally depreciate more rapidly and in some cases are practically rebuilt every time the cells are renewed.

The prevailing type of cells which seems to have been most successful in a commercial sense is a vertical diaphragm cell. There are only two or three installations of cells with horizontal diaphragms in the United States and practically only two installations using the mercury cathode which is also of a horizontal type.

As you will learn in studying the subject, electrolytic cell units are arranged in series and direct electric current is delivered at a fixed amperage and at a voltage depending on the number of cells in the series. Production is proportional to the current applied. The voltage of a cell increases during the life of the diaphragm and the anodes. Under the same conditions the longer the diaphragm remains without renewals the higher the voltage. This is also true of the anodes. Usually where cells can be readily renewed these changes can take place more frequently and thus permit of higher power efficiency during the average run and at higher ampere efficiency with greater production. Where it is less convenient to renew parts, changes are not made so often with a consequent lower power and ampere efficiency. In the latter case an endeavor is made to overcome this tendency of lower efficiency by operating the cells at lower amperage as the cells grow older. This of course cuts down the production and requires a considerable number of spare units usually arranged in one spare circuit.

The above is enough to indicate that each type of cell must be operated in a way to correspond to

(Continued on page IX)

ALUMNI NOTES

'83 BCE. The following tribute to one of our graduates appeared in a recent issue of "The Spur," New York: Edward J. Pearson, President of the New York, New Haven, and Hartford Railroad Company, a portrait of whom appears on another page, is, like most of our great railroad executives, thorough in everything he undertakes. A practical railroad man in every word he utters, in every step he takes, and a graduate from Cornell University, with the degree of C. E., he is familiar with every department of railroad work. As an evidence of his thoroughness, at one time he walked the greater part of the distance from New York to Springfield for the purpose of examining New Haven track and maintenance methods, a straightaway hike of 134 miles. But it required many more miles of hike for Mr. Pearson to accomplish his purpose. He shatters all union labor rules by being on his job from 15 to 18 hours a day.

'88. Monroe Warner is Manager of the Warner Manufacturing Company in Cleveland, Ohio. He lives at 1386 E. 81st Street.

'93. William R. Doores, Colonel in the United States Army Coast Artillery, is now located at Fort Adams, Newport, R. I. Colonel Doores is a member of the National Geographic Society.

'00. Squire E. Fitch is working for the New York State Highway Department. He lives at 33 Pearl Street, Hornell, N. Y.

'01. Collingwood B. Brown, jr., is with the Canadian National Railroads, 1 Toronto Street, Toronto, Ont., Can. He lives at 54 Oakmont Road.

'05. Clinton L. Bogert is Principal Assistant Engineer with Alexander Potter, 50 Church Street, New York City.

'07. Mr. and Mrs. Charles W. Linsley announce the birth of a daughter, Mary June, on June 10. Linsley is plant engineer for the Oswego Candy Works and Long's Chocolate Works, Oswego. They live at 52 E. Utica St.

'07. George H. Rekate is a dealer in automobiles and farm machinery at 130 Central Avenue, Lancaster, N. Y. His home address is 187 Erie St.

'08. Meyer Davis of the H. H. Robertson Company, Pittsburgh, has been making an extensive trip. He is now in Calcutta, India, and will continue on through the Suez Canal and Europe, returning to America about December 1st. His home address is 152 W. 118th Street, New York City.

'08, '09. Edwin R. Thomas has opened a branch office at New Bedford, Mass., for L. E. Locke and Sons, Contractors, and is living at 6 Eighth Street, New Bedford.

'09. Robert M. DeGarmo is Special Maintenance

Engineer on the Key West Extension of the Florida East Coast Railway. His home is in Marathon, Fla.

'09. Albert Diamant has returned from Tocopilla, Chile, and may be addressed c/o Cornell Club, 30 W. 44th Street, New York City.

'10. Wilmer A. Dehnff has been appointed Principal of the Baltimore Polytechnic Institute.

'10. Willis T. Spivey was one of the three members of the faculty of the Drexel Institute, Philadelphia, chosen to take over the executive functions of the institution until a new president is elected. Spivey has been Director of the evening school for nearly 3 years.

'11. Ralph S. Crossman has left Des Moines College and is teaching at the University of Illinois.

'11. George S. Frank has been appointed Manager of Purchases at the University.

'13. Rodney D. Brown is a Highway Engineer with the U. S. Bureau of Public Roads in Washington and his home is at 3215 17th Street, Northeast, Washington, D. C.

'13. C. Reid Johnson is Public Works Officer of the Submarine Base, New London, Conn., in charge of construction, upkeep, maintenance, and operation of public buildings and utilities at the Base.

'13. Albert A. Ward has returned to Ithaca and is with Driscoll Brothers & Company. "Al" is the proud father of a second daughter born at Ithaca about the middle of October.

'14. Fayette L. Rockwell is Vice-President and Treasurer of the Victor Aluminum Manufacturing Company at Wellsville, N. Y. Rockwell was in town to see the Cornell-Dartmouth football game.

'15. A son, Gardner Ely, was born to Lieutenant and Mrs. Henry G. Lehrbach on July 11. Lehrbach is Assistant Public Works Officer of the 11th Naval District. He lives at 4285 Hermosa Way, San Diego, Calif.

'16. Wilson T. Ballard is Assistant Engineer with the Baltimore Paving Commission, Baltimore, Md.

'17. Edward A. Chandler, Jr., is with the Bartlett-Hayward Company of Baltimore, Md. His home is at 615 Melville Avenue, Baltimore.

'17. Mr. and Mrs. Ernst W. Kurz of 910 Five Oaks Avenue, Dayton, O., announce the birth of a daughter, Mary Alice, on August 29. Mrs. Kurtz was Miss Cecelia Driscoll of Ithaca. Kurz is Assistant Engineer with Schenck and Williams, architects, of Dayton.

'17. Sidney W. Mosher is instructing in the Sibley School of Mechanical Engineering this year.

'19. Benjamin C. Michelson is with the McClintie-Marshall Construction Company at Pittsburgh, Pa. Michelson was in Ithaca recently visiting friends

and attending the Cornell-Dartmouth football game.

'19. Leonard Miscall did not return to the University of Illinois to teach Descriptive Geometry this year but has a position with the New York State Highway Department at Albany, N. Y.

'19. Oscar J. Sewell is located at Christopher, Ill., as Resident Engineer on the construction of eight reinforced concrete and one large steel bridge of two spans of one hundred and fifty feet each for the Illinois State Highway Commission. His mail address is Box 666, Christopher, Ill.

MCE '19. Hoong K. Yen is with the N. Y. State Highway Department at Hornell, N. Y.

'20. Joseph H. Christian is with the Bridge Department of the North Carolina Highway Commission at Raleigh, N. C. Henry H. Jones '20 is also in the Bridge Department.

'20. Miss Olive W. Dennis recently spent a week in Ithaca, renewing old acquaintances in the College and University. Miss Dennis is with the Baltimore and Ohio Railroad Company, Baltimore, in the Bridge Department.

'20. Harold S. Fisher is teacher of Mechanical Drawing at the Buffalo Technical High School, Buffalo, N. Y.

'20. Carl J. Hasbronek is with the N. Y. Telephone Company at 15 Dey Street, New York City.

'20. Harold I. MacKen is with the New York Telephone Company at 15 Dey Street, New York City. MacKen spent a few days in Ithaca recently.

'20. Alger J. Smith is with the New York State Highway Department at Hornell, N. Y.

'20. Joseph E. Smith is with Salmon, Shipp, and Poe, General Contractors, Durham, N. C. He lives at 818 Cleveland Street.

'21. Earl R. Andrew is Assistant Engineer with the New York State Highway Department, Buffalo Division.

'21. Miss Margaret G. Arronet is in Petrograd, working for the Russian Railroad in the Bridge Department. She writes that the bridges now being designed for Russia are mostly temporary timber structures, although she was recently working on a design for a metal three span bridge.

'21. James H. Cheston is Surveyor with the U. S. Engineer Department, First District, New York.

'21. Gustave Chirlian is an Assistant Engineer with the New York State Highway Department, Buffalo Division. His address is Box 81, Delavan, N. Y.

'21. Edward L. Duffies is with the Andrews Asphalt Pavement Company, and is now in Logansport, Ind.

'21. Paul E. Fitzpatrick was married recently and went to Bermuda on his wedding trip.

'21. C. Edward Hermann, after two months' prospecting in Alaska, has sailed from Vancouver for Honolulu, the South Sea Islands, Australia, and New Zealand. He will spend a year travelling around the world.

'21. Harold I. Hettinger is Assistant City Engineer for the city of Freeport, Ill. He resides at 879 Stephenson Street.

'21. William J. Madden returned to Ithaca with "Art" Fertel for the fall Alumni Day, October 22, and the Colgate game. Both are working with the New York State Highway Commission, Hornell Division.

'21. Roy E. Pratt is an Assistant Engineer with the New York State Highway Department, Buffalo Division.

'21. Joseph Raducziner is Assistant Engineer with the New York State Highway Department, Hornell Division.

'21. Richardson Selee is in the army at Camp Humphreys, W. Va.

'21. Marcus Sagal has been working for the Baltimore Paving Commission. He stopped off at Ithaca to see the Cornell-Dartmouth football game when on his way to take a position with the Illinois State Highway Commission.

'21. S. John Seacciaferro is Assistant Engineer with Alexander Potter, 50 Church Street, New York City. He has been elected a Junior in the American Society of Civil Engineers.

'21. Earl J. Sherk is Engineer with Gannett, Seelye, and Fleming, Inc., Consulting Engineers, of Harrisburg, Pa. At present he is engaged as Resident Engineer on the construction of a hydro-electric power dam at Wiscoy, N. Y. His address is 1849 Regina Street, Harrisburg, Pa.

'21. Michael G. Sullivan is with the New York State Highway Department, Rochester Division.

NEW MAILING ADDRESSES

'76. C. Paes de Barros, Rua Ste. Ephygenia 20, Sao Paulo, Brazil.

'88. Monroe Warner, 1386 E. 81st Street, Cleveland, Ohio.

'93. William R. Doores, Fort Adams, Newport, Rhode Island.

'95. Dr. John Weatherson, 734 Oakwood Blvd., Chicago, Ill.

'96. Frank S. Senior, 50 Church Street, New York.

'00. Squire E. Fitch, 33 Pearl Street, Hornell, N. Y.

'01. Meier G. Hilpert, 33 West Church Street, Bethlehem, Pa.

'07. Gordon B. Canaga, 4754 N. 9th Street, Philadelphia, Pa.

'07. George H. Rekate, 187 Erie Street, Lancaster, N. Y.

'09. Albert Diamant, c/o Cornell Club, 30 W. 44th St., New York City.

'09. Edwin R. Thomas, 6 Eighth St., New Bedford, Mass.

(Continued on page XII)



COLLEGE NOTES

PENN GAME Just as we were going to press the following report was received from Philadelphia: "Thanksgiving Day, 1921, Cornell 41, Pennsylvania 0." Full details of the game will appear in our next issue.

In the first few moments of the Cornell-Colgate game the Colgate representatives threw a scare into the Cornell camp by securing the first score that was made this season against the Red and White. However, the Big Red Team soon accustomed itself to the trick plays of the Maroon, and with heavy line plunges, scored four touchdowns with goals. A field goal, kicked by Hansen added the other three points.

After their initial tally, Colgate threatened the Cornell goal line by once. Unable to gain first downs by line plunges, the Maroon resorted to forward passes thrown from open formation. A successful attempt in the fourth period gave a Colgate player the ball with an open field to the goal line. Red Gould, substitute for Kaw, overtook the runner and, with a flying tackle, dashed Colgate's hope for another score.

Cornell—59 On the twenty-ninth of October, Cornell undergraduates and Alumni were treated to a real game of football when Dartmouth was defeated on Schoellkopf Field. Cornell scored first, early in the game, but the score was tied in the second period when Dartmouth crossed the Cornell goal line for their only score of the game. At this point, the momentum of the Red and White team seemed to mount to such heights that they were irresistible, and before the second period ended, they crossed Dartmouth's goal line the second time; score at the end of the first half, Cornell—14, Dartmouth—7.

In the third period, Cornell started off with a rush

and amassed twenty-one more points before the whistle blew, Dartmouth being unable to check them.

The fourth period was a continuation of the third. Three touchdowns were secured in the last fifteen minutes of play. It was in this quarter of the game that Carey repeated his act of the Cornell-Dartmouth game of 1920. Sent in at Pfann's call for a placement kick, he made a pretty drop kick from the 35 yard line, thus adding three more points to Cornell's already big score.

Cornell and Dartmouth are gradually entering into a closer athletic relationship fostered by clean and sportsmanlike playing. It is not improbable that next year will see Dartmouth occupying a more conspicuous place on the Cornell football schedule.

Cornell—41 The Big Red Team annexed its sixth victory when it trimmed Columbia to the tune of 41 to 7. Straight **Columbia—7** football made first downs continually for the Red and White, while the New Yorkers were unable to make more than two first downs by line plays. The first quarter ended with the score Cornell—21, Columbia—0, and at the end of the first half Cornell had added thirteen more points.

The most spectacular play of the game came in the second quarter. An exchange of punts gave Kaw the ball on Cornell's 20 yard line. He fumbled, recovered, and then dashed away, dodging all tacklers. Koppiesh finally threw him on Columbia's 10-yard line. Three plunges and Pfann went over for the score.

Columbia scored in the final moments of the second half. Applebaum intercepted a forward pass and carried it to the Red and White's 9 yard line. Three line plunges failed but a forward pass, DeStefano to Burt, put the ball over for the touchdown.



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Cornell—14 almost the strength of a blizzard,
Springfield—0 and in slush, ankle deep, the Big Red Team, minus Captain Dodge, Eddie Kaw, and Dave Munus, handed Springfield defeat to the tune 14 to 0. Playing under such weathered conditions made it almost impossible to make long gains. Fumbles were frequent in the latter part of the game and these came at moments when steadiness meant a score.

Ramsey secured the first touchdown after the first kick-off, Springfield not regaining the ball once. The second score came in the last quarter when Post, substitute for Gould, managed to hang onto the ball long enough to get across the goal line after line plays had carried the ball down within striking distance of it.

MEETING OF THE CORNELL SOCIETY OF CIVIL ENGINEERS

The first regular fall meeting of the Cornell Society of Civil Engineers was held at Barnes Hall Monday, October 31, 1921. The meeting was opened by Tom Finn, President of the Society. Thompson acted as chairman of the gathering and from the number of true stories Tommie told, anyone would believe that he'd been around the world a number of times. Tevonian gave several selections on his violin and it is hard to see why he is studying engineering as his fortune apparently lies in his violin.

Dean Kimball was called upon for an address, his topic being mainly about our new president and his relation to the engineering colleges. Dean Kimball said in part "President Livingston Farrand would probably understand the engineering colleges and their problems more clearly than any of our previous admirable presidents, because he had been trained along scientific lines and although not an engineer could more easily grasp the fundamentals of our problems. With Farrand at our helm we would undoubtedly grow stronger and become more successful, particularly in the engineering departments."

The "Summer Camp Orchestra" consisting of Breen, Barreto, Toms and Dredla were next on the program. They were quite up to their previous

standard and received ovations for encore after encore. Thompson couldn't make out what the next thing was on the program but believed that it was a clog dance. He called for the unknown to step forth and Director Barnes advanced amid tumultuous applause. He disappointed us in that he didn't give us a dance but more than made up for it in his talk of the evening. Professor Barnes briefly sketched the life of the organization from 1874 up to the present time. He also lauded the work of those three men, Professors Church, Fuertes and Crandall who are directly responsible for the position that the Civil Engineering College holds in the world today.

The big occasion of the evening was now at hand, the "cats" were ready and all rushed to the dining room where there was an abundance of crullers, cider, and sandwiches.

The meeting was very well attended and everything points to a bright and successful year in the association. The officers for the year 1921-1922 are as follows:

President	T. D. Finn, Jr., '22
Vice-President	R. S. Anderson '22
Athletic Director	F. O. Schreiner '22
Secretary	J. S. Hammigan '22.

The association was so successful last year that the Mechanical and Electrical Engineers are attempting to form an association patterned after ours.

FACULTY NOTES

During the past summer Professor L. C. Urquhart, '09, of the Department of Bridge Engineering conducted an investigation at the reservoirs of the Elmira Water Works. Especial emphasis was laid upon the study of the future needs of the city and, consequently, on future expansion of the water works system.

During the month of October, Professor J. L. Weber of the Department of Hydraulics in conjunction with Professor Urquhart made a series of pressure tests for the Elmira Water Works. Basing their recommendations on the results of these tests, they advised the Elmira Water Works Board to install additional mains. At the time of going to press these mains are being laid.

(Continued on page XII)

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STEEL MILL BUILDING GIRTS

(Continued from page 38)

Some engineers say that girts act as a string and cannot be "figured". It seems logical, however, because of the stiffness of the sections used and because of the clearance in the connections to design girts as beams.

The following table is based on Mr. Fleming's specification, which gives a uniform horizontal load of 15 pounds per sq. ft. and an extreme fibre stress of 24,000 pounds per sq. in. :

Note that material can be saved in some of the above cases provided the specifications used on a particular design allow channels with webs less than $\frac{1}{4}$ in. thick. Use one line of $\frac{5}{8}$ in. round sag rods in 20 ft. bays and under. Use two lines of $\frac{5}{8}$ in. round sag rods in bays over 20 ft. in length.

Standard stock lengths of black and galvanized corrugated steel sheeting are 5, 6, 7, 8, 9 and 10 ft. There is an extra charge for 12 ft. lengths, which are the maximum obtainable. Whenever possible, girt spacing should be arranged to suit these lengths.

TABLE 2.

TABLE OF GIRT SPACING FOR CORRUGATED STEEL
From Curves in Ketchum's "Structural Engineer's Handbook," page 22.

Gage	Load in pounds per sq. ft.	
	30	20
18	5'-0"	6'-0"
20	4'-4"	5'-2"
22	3'-11"	4'-9"
24	3'-7"	4'-4"

THE ELECTROLYTIC MANUFACTURE OF CHLORINE AND CAUSTIC SODA

(Continued from page 41)

its characteristics and for obtaining the lowest possible cost consistent with high production. The arrangement of the cells and the construction of the building are matters of considerable importance to avoid unnecessary depreciation, leakage of electric current and unnecessary upkeep of the cells. Good operation will largely depend on the way the plant is laid out.

Electric energy must be supplied to the electrolytic cell equipment and must be arranged in units which will give the desired current at the desired voltage and at the same time allow for shut downs in the electrical machinery without unnecessarily curtailing the output from the cells. Several units as a rule are installed in order to keep down the cost of spares. If direct current is available then electrical machinery is necessary to bring it to the proper current and voltage required by the cells. If the current is alternating as in most cases then electrical transformers such as rotary converters or motor generators are used to bring about the conversion to direct current. In the case where the power is generated at the plant a considerable loss for conversion can be avoided by generating direct current.

GOOD LIGHTING OF INDUSTRIAL PLANTS SECURES SAFETY AND EFFICIENCY.

The Code of Lighting for factories, mills and other work places of the State of New Jersey makes excellent recommendations of daylight for the proper lighting of industrial buildings.

Adequate daylight facilities through large window areas, together with light, cheerful surroundings, are highly desirable and necessary features in every work place, and they should be supplied through the necessary channels, not only from the humane standpoint, but also from the viewpoint of maximum plant efficiency.

Importance of Daylight.

The unusual attention to gas and electric lighting in factories, mills and other work places during the past few years; the perfection of various lamps and auxiliaries, by means of which an improved quality and quantity of lighting effects are obtained; and the care which has been devoted to increasing the efficiency in various industrial apparatus—all go to emphasize the many advantages and economies that result from vital and adequate window space, as a means for daylight in the proper quantities, and in the right direction during those portions of the day when it is available.

Three Considerations.

Three important considerations of any lighting method are sufficiency, continuity and diffusion, with respect to the daylight illumination of interiors. Sufficiency demands adequate window area; continuity requires (a) large enough window area for use on reasonably dark days, (b) means for reducing the illumination when excessive, due to direct sunshine, and supplementing lighting equipment for use on particularly dark days, and especially towards the close of winter days, (c) diffusion demands interior decorations that are as light in color as practicable for ceilings and upper portions of walls, and of a dull or matt finish, in order that the light which enters the windows or that which is produced by lamps may not be absorbed and lost on the first object that it strikes; but that it may be returned by reflection and thus be used over and over again.

Diffusion also requires that the various sources of light, whether windows, skylights or lamps, be well distributed about the space to be lighted. Light colored surroundings as here suggested result in marked economy, but their main object is perhaps not so much economy as to obtain results that will be satisfactory to the human eye.

Requirements for natural lighting:

1. The light should be adequate for each employee.
2. The windows should be so spaced and located that daylight is fairly uniform over the working area.
3. The intensities of daylight should be such that artificial light will be required only during those portions of the day when it would naturally be considered necessary.
4. The windows should provide a quality of daylight which will avoid a glare, due to the sun's rays, and light from the sky shining directly into the eye, or where this does not prove to be the case at all parts of the day, window shades or other means should be available to make this end possible.

As will be noticed in the above recommendations, large windows and proper diffusion of daylight are urged, in order to meet the demands of daylight lighting.

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MORRILL HALL

ITHACA, N. Y.

There are many accessory pieces of equipment used in connection with the power in the electrolytic departments in Caustic Soda and Chlorine manufacture but we will not dwell on these things.

The Chlorine comes from the cells in the form of gas and is connected through pipe lines and delivered through suction pumps or fans to the point of application. The Caustic Liquor is collected in tanks and stored for finishing. The brine which is used in the cells as the electrolyte is made up from the rock or evaporated salt of best grade. It is shipped in the usual commercial form in bulk and stored either in dry form or in tanks under brine. This brine is purified by settling and mixing with Soda Ash and Caustic Liquor to precipitate magnesium and calcium salts. It is then filtered and neutralized and stored ready for delivery to the electrolytic cells. We have now dwelt briefly on some of the practical points surrounding the generation of the Chlorine and the production of the Caustic Soda in raw state, that is, as Caustic Liquor. The remaining steps in the manufacture of these chemicals is finishing and placing them in marketable form.

Caustic Liquor is first evaporated in so called vacuum pans, single or double effect. As the water is evaporated and salt settled out and returned after proper washing to the brine, the Caustic Liquor is concentrated to about a 50% solution and then the salt is settled out by further cooling. This concen-

trated Caustic Liquor is delivered to cast iron pots and concentrated further by direct firing of the pots underneath. These pots are usually of cast iron two to three inches thick and ten feet in diameter and six feet deep. As the Caustic Liquor is concentrated tests are taken to determine its quality and corrected by the addition of sodium hyposulphite and other chemicals. When the water has all been driven off firing is brought to a high point and then gradually lowered until the desired temperature for packing has been reached. This allows for the settlement of impurities. Caustic Soda is then either dipped out in large iron ladles or is syphoned or pumped out into sheet iron drums holding some 700 lbs. of solid Caustic Soda. When the Caustic becomes cool, it is a solid white crystalline mass and is then ready for shipment.

In this process of finishing Caustic Soda a steam plant is required to furnish the heat for the evaporators. The finishing of Caustic Soda is a process requiring some degree of skill. The building is of the usual boiler room type due to the operation of evaporating of Caustic Liquor.

The finishing or bringing the Chlorine in marketable form is the other main department in Caustic Soda and Chlorine manufacture. In most of the large plants the Chlorine has in the past been largely used for making bleaching powder or Chloride of Lime. This process in modern practice con-

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sists in delivering Chlorine Gas to large concrete chambers following closely the designs according to Marsh patents some six feet in height and of various lengths and widths on floors where dry hydrated lime has been spread. After a cycle of operations in which the Chlorine Gas is delivered to a series of chambers, the lime will have absorbed all the Chlorine and each chamber is cut out in succession. The Chloride of lime on the floor is shovelled through openings into large steel drums. It is then ready for shipment. This department includes the lime preparatory equipment and in large works consists of crushing quick lime and storage and hydration in modern hydrating machines. Considerable amounts of the hydrated lime are stored for cooling so as to be ready for delivery to the chambers.

The up to date method of finishing chlorine for the market is the manufacture of Liquid Chlorine. The liquefaction of Chlorine consists largely of drying the Chlorine by cooling or refrigeration or by removing moisture with sulphuric acid sprays and by compression. Air compressors with special valves can be used. The gas can also be compressed by the well known method compressing gas by falling liquids as developed in the past for compressing air by falling water. In this case the Chlorine Gas is compressed by a falling column of sulphuric acid. The compressed gas is refrigerated under pres-

sure to Liquid form. It is stored in tanks or cylinders ready for shipment. Liquid Chlorine is usually shipped in cylinders of 100 to 150 lbs. equipped with special valves. Chlorine is also shipped in tank cars of from 10 to 15 tons capacity. Special precautions are required such as insulating tank cars against high temperature and thus preventing a very high pressure.

The other departments in a Caustic Soda and Chlorine manufacturing plant are similar to that of any large chemical operation. I refer to machine shops, repair shops, stores, general offices, railroad facilities and sidings, water supplies, drainage, factory communications, roads, fire lines and apparatus, lighting and power which in the modern factories is usually electrical and all the emergency and welfare departments which are important in a chemical factory.

The manufacture of Chlorine and Caustic Soda of course does not end in the mere routine of production. The processes are continuous and chemical control is important. This implies an elaborate system of routine tests both in the chemical laboratory and in the clerical departments and in the general office. Graphic and daily records are absolutely necessary so that all departments run uniform as to quality and quantity of material being made or finished.

Besides this, a research laboratory and a development department is usually required in order to keep the apparatus up to date and overcome the problems which constantly arise in the manufacturing plants.

The personnel of a manufacturing plant is usually divided under two general heads, the operating or routine management and the development or construction unit.

There is a further division which is very important namely that of sales which is usually located wherever the central market exists. Very close co-operation is necessary between the sales, operating, and engineering divisions.

The electrolytic manufacture of Caustic Soda and Chlorine is not restricted to the manufacture of these commodities. The tendency is for large plants to manufacture more by-products thus entering into the field of supplying general chemicals with the main products as a basis for by-product developments. This tendency is accentuated because consumers are more and more making the main products in their own electrolytic plants.

Modern electrolytic equipment is making it more practicable for smaller manufacturers and users of these products to generate their own Chlorine and Caustic Soda especially where both these products are used or where the by-product hydrogen can be used also. The cost of manufacture of Chlorine and Caustic Soda and its by-products can be reduced as much as 20% by the use of the modern Marsh Electrolytic Cell Batteries.



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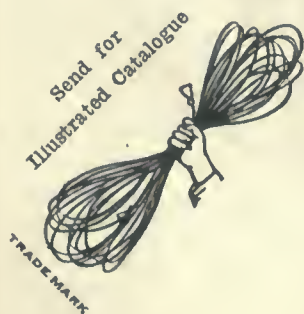
Syracuse Meet On October 29th the annual Syracuse Invitation Cross Country Meet was held over the Syracuse Course. While not all the colleges taking part in the Intercollegiate were entered there was a fairly representative gathering of colleges present, including Cornell, Syracuse, Columbia, M. I. T., Colgate, and Yale. Cornell won the meet handily with a score of fifteen, the lowest possible score. Syracuse was the next nearest contender with a score of 75, and M. I. T., which had been considered by many as the strongest contender, since they had beaten Harvard the week before, was third with a score of 90. The first four men to finish the race, all of them Cornellians, finished a dead heat, being so close together that it was impossible for the judges to determine who was the winner. The fifth man to finish was also from Ithaca being but a few yards behind these four. It is believed that this is the first time in the history of Interecollegiate Cross Country Running that four men have ever finished a four-and-a-half mile course in a dead heat, at the same time breaking the record for the course. Once more Coach Moakley has demonstrated that Ithacans are always to be feared in the Hill and Dale races. The four runners who tied for first place in this meet were N. P. Brown, R. E. Brown, Miske and Carter, the Captain of the team. As Carter is Captain the individual cup for the race was awarded to him.

On the following Saturday, November 5th, the team held its second meet of the year with Harvard at Cambridge over the famous six-mile course, one of the hardest courses in the country. While the score made was not a perfect one as had been made the week before, when only the five men to finish had counted, it clearly demonstrated the superiority of the Red and White over the Crimson. The score was 29 to 87, Cornell men finishing in the first, sixth and eighth places, the first seven men to finish from each team counting in the score. In this race R. E. Brown was the first man to cross the finish line followed closely by N. P. Brown. Then came Miske, Richman, and Carter, who had stayed with the trailers in order to keep them up with the field, as long as possible.

NEW MAILING ADDRESSES

(Continued from page 43)

- '11. Clarence H. Davidson, 3 Mount Pleasant Street, Amherst, Mass.
- '12. Alfred K. Starkweather, 8 Farrington Street Caldwell, N. J.
- '15. Fred C. Brandes, 1024 Newton Street, Northeast, Brookland Station, Washington, D. C.
- '18. Ross W. McKinstry, 101 Fourth Street, Hinsdale, Ill.
- '20. Chia T. Yeh, 113 Kiangsi Road, Shanghai, China.
- '21. Gustave Chirlian, Box 81, Delevan, N. Y.



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OF CORNELL UNIVERSITY

VOL. XXX, No. 4

JANUARY, 1922

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A deep canyon and rock cut encountered in work on the Navajo Canyon Cooperative Project. This work is one of the projects now under construction by the Department of Agriculture through the co-operation of its Forest Service and its Bureau of Public Roads.

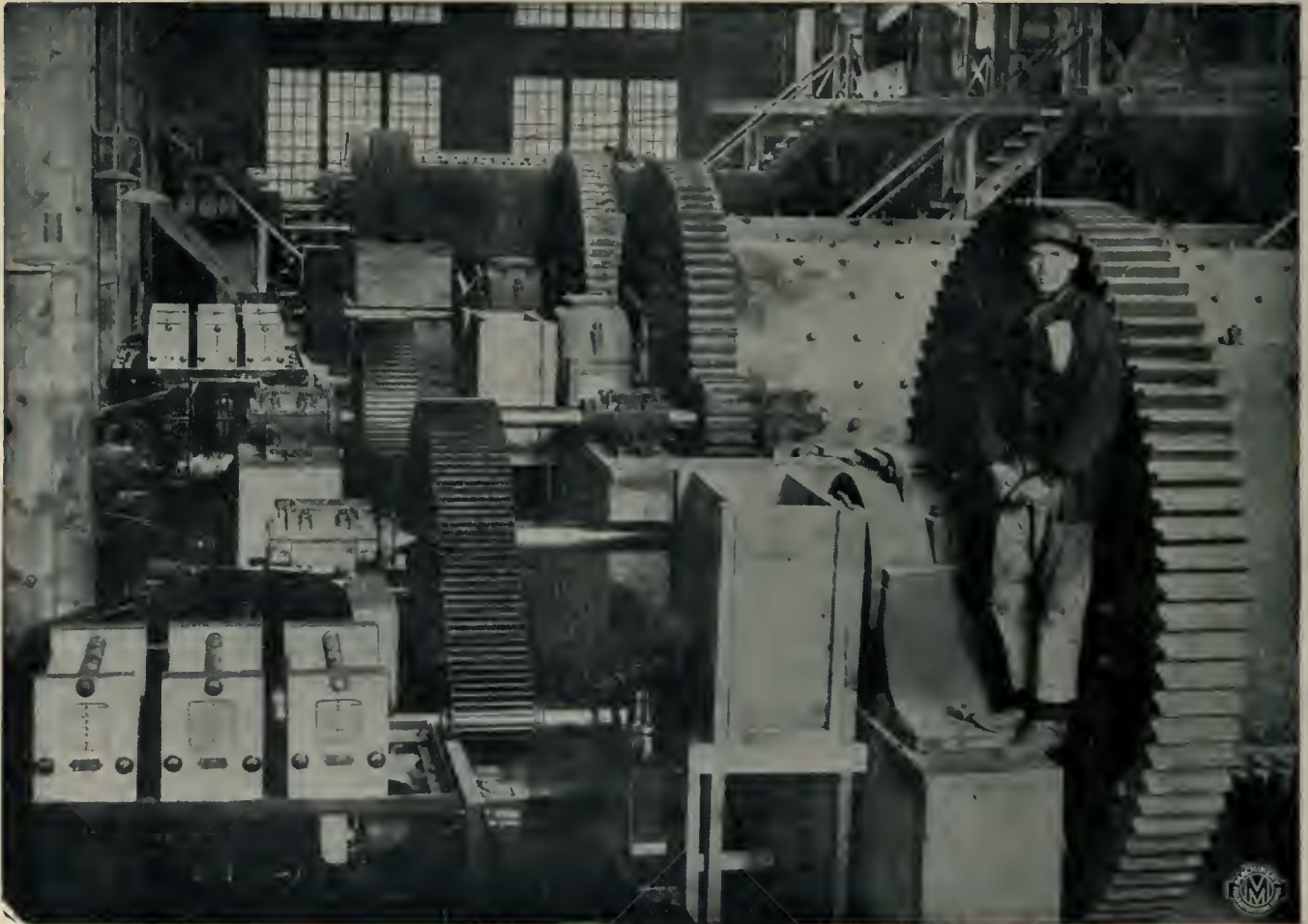
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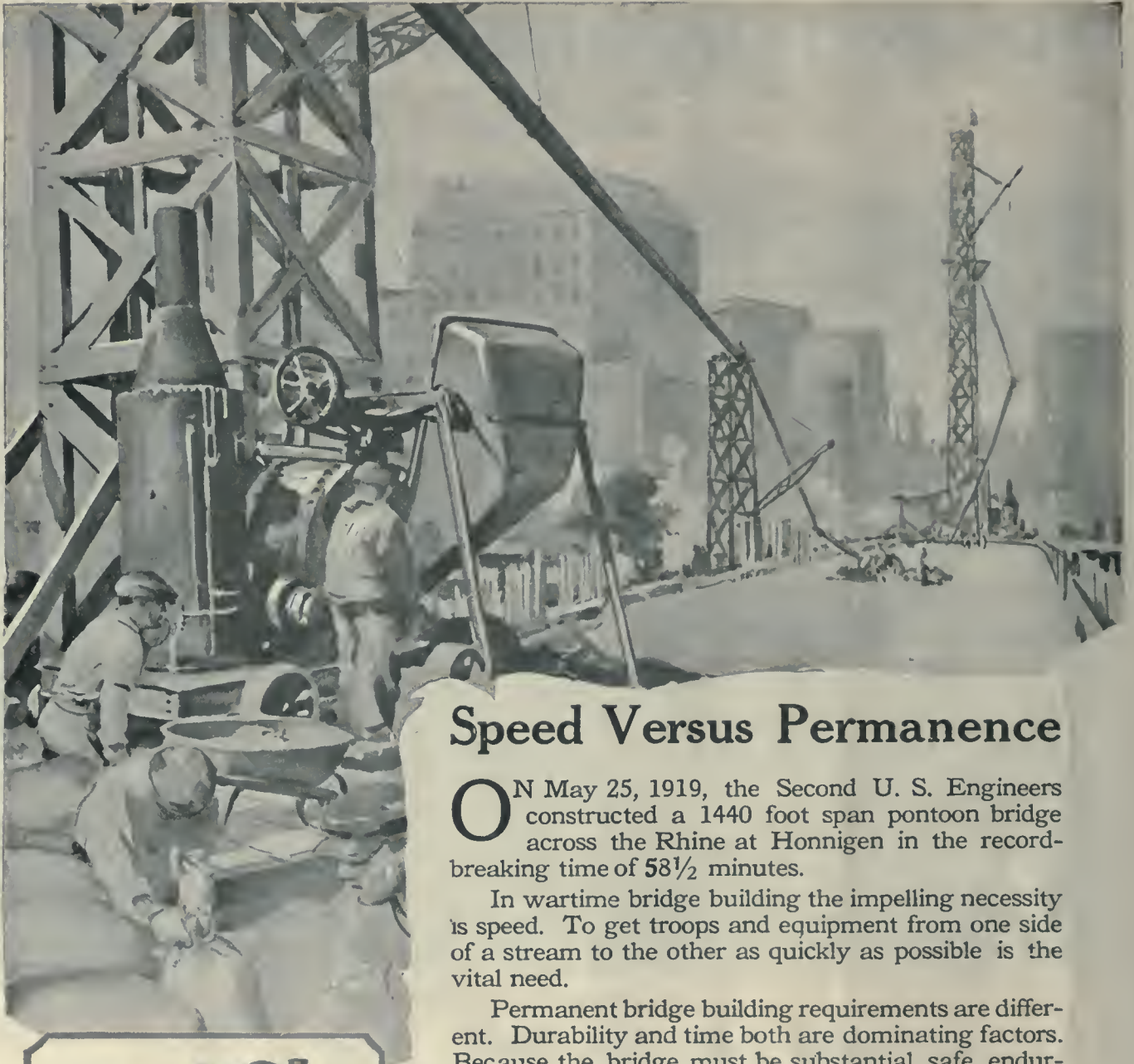
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JANUARY, 1922

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Present Status of Water Power Development in New York State. By Friend P. Williams, '99.....	47
An article dealing with the water power situation in New York State at the present time. Mr. Williams, as Chief Engineer of the New York State Water Power Commission, is in a position where he can observe the general trend regarding water power work. The article deals briefly with the statistics of present development, what rights are necessary for the development of water power rights, and with the larger projects now under way.	
Road Construction in Our National Forests. By F. M. Mills	49
This article deals with the various projects of construction now under way under the auspices of the Bureau of Public Roads, in our National Forests. Frank K. Bishop '93 is the Chief of the Division of Construction on this work. The article covers projected work, work now under way, and work completed in the past two years.	
The New York State License Law. By Professor Sidney F. George, '05.....	53
The New York State Licensing Law, which was passed by the New York State Legislature, will become a law on May 5, 1923. While it has been given the usual publicity, we feel that it is of such importance to engineers, and to students about to become engineers that a resume of the more important parts of the law will not be amiss at this time.	
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Speed Versus Permanence

ON May 25, 1919, the Second U. S. Engineers constructed a 1440 foot span pontoon bridge across the Rhine at Honnigen in the record-breaking time of 58½ minutes.

In wartime bridge building the impelling necessity is speed. To get troops and equipment from one side of a stream to the other as quickly as possible is the vital need.

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Vol. XXX

JANUARY, 1922

No. 4

EDITORIALS

A CHANGE OF POLICY

For a long time we have felt that our magazine was not of as much interest to our student subscribers as it might be. This feeling grew upon us the more and more we tried to explain the average student's non-support of his college publication. We have discussed many solutions of this perplexing problem among ourselves, and, with this issue have put one solution into effect.

The old College Notes Department which had been the rule in our magazine for the past twelve years, has been broken up with this issue, into two departments, the School Notes Department and the University Notes Department. In the School Notes Department there will be published matter referring to doings in the School of Civil Engineering only. Under University Notes will appear the more important happenings in the University Community. The space allowed in each issue the School Notes Department will be about two pages and for the University Notes will be about one page.

Each month therefore, C. E. students may look forward to two pages of up-to-the-minutes news of what is happening in their own college. Spicy bits of C. E. humor, witticisms on the part of professors or students, humorous situations in class-room, on the field or in the laboratory will be interspersed with the more serious accounts of C. E. Association

GREETINGS!

The New Year dawns. An opportunity to close the book of the past year and start off afresh with a clean slate presents itself. Students resolve to work hard in the short time that remains before dreaded finals. Professors glance back at the past and then look ahead, with a new determination—a resolve to strive to make better men out of the youths whose training they direct. Alumni sigh and note with regret the increasing years of separation from their Alma Mater.

The New Year dawns and causes some to pause and reflect. Some become pessimistic about the future. At present we are passing through a period of "hard times." But, conditions will improve as the New Year takes on age. Business will improve. It must.

The Board sincerely hopes that the New Year will bring you all a fullness of health, happiness and prosperity.

Meetings, victories (of which we hope there will be many) of the C. E. College Teams in the Intercollegiate Contests and portrayals of various C. E. students of importance in the University community. In this way, we are planning to give the "Cornell Civil Engineer" a human touch.

But, fortunately or unfortunately, we must depend on student cooperation to make the new department of School Notes a success. For this reason we have placed a contribution box for students on the table in the ante-room of the Director's office. We hope that we will have your co-operation in making our new department a success. We hope that you will indorse our change of policy with better support, both moral and financial, in the future.

PRECISION.

Truly a graduate from a technical institution is not an engineer if he lacks this essential qualification. The successful engineer is one who does every detail of his work thoroughly, and does not balk at each and every problem of difficulty by which he is confronted. A man of such habit in the business world, will in most cases recollect that he fostered this tendency in college, to do his assignments in the same slipshod manner.

The nucleus of a successful engineer is molded in his four years at college. Not readily susceptible

by nature to knowledge, he who at all times, completes his work in hand, will later prove of more service to his profession than the man who possesses the ability of quick comprehension, but fails in the precision of his work.

Let us turn to the college, where the student shapes the habits and characteristics which generally cling to him throughout his life. Too many undergraduates here at Cornell are "sliding" thru their four years of technical training. This condition seems to prevail in all classes. Is it because the assignments are rather difficult, or because each instructor requires too much preparation for his respective course or because the majority of students are more interested in extra-curricula activities of the University?

A habit, good or bad, which after having been carefully nursed during college life, is practically indelibly marked as a man's characteristic in the years to come. Inaccuracy and carelessness in the solution of problems in the daily routine of the classes, is the foundation, and a strong one, of an unreliable engineer, after graduation. It is no easy matter to uphold one's determination to prevent the following of the natural tendency to shirk a little work here and there.

Computations of any nature offer unlimited opportunities of practicing this vice. Vice, we may term it, since it is a menace to a young man's progress in the world. Too often, as in surveying for example, accuracy, usually to the thousandth decimal place and often to a higher degree, is required. A student, anxious to complete his problem quickly, and with a form of social indulgence uppermost in his mind, can be relied upon to disregard some seemingly negligible quantity. This error accumulates, resulting in an answer, which, to be sure, is only a few hundredths off, but a fractional discrepancy of this nature, later proves to have made the data secured of little value. Simply for the sake of conservation of time, usually but a few minutes, he has sacrificed precision.

Surveying does not stand alone as a field for this dangerous practice. A line carelessly drawn on a plan of a bridge or building, may result in the worthlessness of the design. An act of carelessness in the determination of stresses for members of a roof truss may be the cause of considerable inaccuracy in the design of the entire structure. Innumerable instances can be quoted, where pure laziness will prove a serious detriment in the correct solution of a problem.

What could be more discouraging to an employer, than to have as his subordinates, a group of young men who insist upon making these inexcusable errors? Consequently, what would more quickly be the cause of a young engineer suddenly finding himself without a position?

Men come to college to learn the engineering game. Precision is a potent factor in this profession,

therefore it behooves a student to become its master. This is the fundamental principle of a successful engineer, and without the possession of this qualification, a man will find success a truly far distant goal.

THE FUERTES

The students in the School of Engineering have, for the last few years, been rather indifferent to the opportunity offered them by the Fuertes Memorial Prizes in Public Speaking. This contest, which results in prizes of \$125, \$35, and \$20 respectively to the three leading contestants, has of late fallen into the hands of men from the School of Mechanical Engineering and the College of Architecture. Donated by Charles H. Baker, C.E. '86, what could be more fitting than to see an undergraduate of the same college romp off with the spoils?

Two years ago, a student of the Mechanical Engineering College acquired the first award, whereas the second place was left to E. F. O'Brien, '20, of our college. Architecture had matters very much as they chose last April, when they secured both first and second awards. Only one contestant represented our college, but he failed to place.

This competition is held annually in April, the requirements being that the speech should not exceed fifteen minutes in length and should be based upon any technical subject the competitor may desire. The delivery must be without notes, but illustrative material, such as diagrams, plans, models or lantern slides may be used. The award is made by a committee of five members, each college being represented.

Surely the School of Civil Engineering can boast of several Juniors and Seniors who could reflect honor upon their school by winning this contest. As a college, we have fallen considerably below our standard in intercollege activities during the last few years. Here is an opportunity by which we can again place the Civil Engineering School in the limelight.

ANNOUNCEMENT OF ELECTIONS

At a meeting of the board on December 2, the vacancy in the Junior Editorial staff was filled by the election of G. J. Oehrlein, '23, as a Junior Editor. George hails from New York City and due to his excellent work while on the competition, he was the unanimous choice of the board.

Both the editorial and business competitions of the Sophomore class were concluded at a meeting two weeks later, December 16. The competition for both departments was keen, but after carefully considering the work done by the men out for the few positions, the following elections were made.

C. E. Welles, '24, of Denver, Colo., and C. L. Brownell, '24, of Glens Falls, N. Y., were chosen representatives of the Sophomore class on the editorial staff. Immediately afterward, the election of the Sophomore business staff was made. M. C. Newton, '24, a native of Forest Home, a suburb of Ithaca, and P. F. Beaver, '24, of Longmeadow, Mass. were the successful candidates.

PRESENT STATUS OF WATER POWER DEVELOPMENT IN NEW YORK STATE

Statistics—Water Rights—Projects Now Under Way

By F. P. WILLIAMS, '99.

Chief Engineer of the New York State Water Power Commission

In tracing briefly the history of water power development in this State, the following main points of progress are observed:

(1) Of about two thousand water power developments of all sizes in the State, the greater proportion of the water powers were developed during the fifty years preceding 1875. The development of commercial electric power towards the end of the nineteenth century brought with it the increased development of water power by rebuilding many existing plants into hydro-electric plants, and developing some additional sites.

(2) The greater activity due to hydro-electric development subsided during the first few years of the twentieth century. The next stimulus to increased water power development, is due to the improvements in transmission of power which has taken place in the past few years. With the successful transmission of power, 250 miles, and the possibilities of successfully transmitting it twice that distance, a much greater development of water power is apparent.

(3) In addition to the improvements in water power and electrical machinery and transmission, the advanced cost of fuel is another strong inducement for further power development. Available data shows that fuel in 1920 cost 125 per cent above the cost in 1914. The cost of fuel used in power generation in central power plants in this State increased from \$2.54 (a short ton) in 1914 to \$6.57 in 1919. According to the Public Service Commission's Report, which includes only central generating plants, the net charges for metered current in 1919, however, decreased 11 per cent compared with similar charges in 1914. The explanation is largely attributed to the increase in hydro-electric power development, and furnishes a strong argument for the development of water powers. With the plenty of cheap fuel that has existed in the past, there has not been the incentive to fully develop available water power. However, the problem of the rising cost of fuel, and also its ultimate exhaustion, afford ample incentive to further all feasible water power developments at the present time.

Power Statistics

The total amount of power of all classes in the State, except steam railroads, is about $4\frac{1}{2}$ million horsepower. The rate of increase in amount of

power developed for the past few years is about 10 per cent. The opportunity of meeting this steady increase of power in the face of high fuel cost and the menace of exhaustion of fuel supplies already with us, appears to be to develop additional water power to protect the future industrial development and advancement.

Of the $4\frac{1}{2}$ million horsepower developed at the present time, about one million are developed by water power. Of the total available water power in the State, estimated at 3,000,000 horsepower, about one million are at present developed.

From a comparison of the above figures, it will be seen that there is sufficient demand for power to utilize all the available water power. The full development of all the available water power will come about in time. The two forces that govern the rapidity of such development are the growth of industry with increased power demands as a consequence, and fuel costs, which from recent events are shown to be mounting.

The problem of determining what power is feasible, when it is appropriate to develop it, rests largely with the engineer. In order that the development is made along proper lines, there should be a careful analysis of every project. Economical water power development is such a development that will produce power to a consumer on his premises as cheap, or cheaper than such power can be produced with fuel. To offset the fuel costs that exist with steam generation, the hydro-electric power development requires a much higher fixed charge for plant, estimated at two or three times that of the ordinary steam plant. The engineer has an excellent field in steering capital into profitable enterprises, for it will be found that all water power cannot be economically developed.

Water Power Rights

There are various rights necessary in the development of water power. In addition to the riparian owners, the State owns the bed of numerous streams. In the case of interstate streams or boundary streams, such as the Niagara River and St. Lawrence River, the Government has jurisdiction insofar as navigation interests are affected. On account of the variety of interests, which includes private, State and Government, in connection with some projects, there has been a delay in proceeding

with the projects where such multiplicity of interests are concerned.

In the case of public ownership, no central authority existed for authorizing projects where rights of public were involved.

In order to overcome this difficulty, and to place the responsibility in definite hands, as well as to safeguard the public interests, the State this year passed the Water Power Act, under which the New York Water Power Commission has jurisdiction over water power developments. A similar Commission was authorized by the Government in 1920, known as the Federal Power Commission. Several states have commissions, or have specified representatives, usually the State Engineer, to supervise the conditions under which water power projects can be undertaken. Such commissions are especially notable in the western states where water power has not been so fully developed.

Although in New York State there has been considerable delay in passing a Law to govern water power development, the State has been active for a number of years in furthering water power development by making available surveys of watersheds, keeping streamflow records, and publishing information about projects. Water power surveys and investigations have been completed for all of the important watersheds in the State, and streamflow data records have been published and are available over a long term of years.

N. Y. State Water Power Commission

In addition to the duties of making investigations and collection of data, the Commission receives and grants licenses under prescribed conditions, and settles upon the rentals, where the projects involve waters or lands in which the State has an interest. To date twenty applications are before the Commission, involving about $1\frac{1}{4}$ million horsepower. Most of these projects are located on the Barge Canal, along the Niagara River and along the St. Lawrence River. The project along the canal have been made possible by the Barge Canal construction. Until the present Water Power Law was passed, there was no satisfactory way to proceed with the development of such waters. The water power is made available; first, due to the canal in some instances being used as a carrying agency; second, on account of storage dams, at which dams, power plants can be located to utilize the water under a head as it is discharged from a reservoir; and third, at the dams on canalized streams, built for canal purposes where power houses can be built for utilizing water that is at the present time running to waste at the dam. The safeguarding of navigation in the canal is of first importance under the law, and all water power development is subject to conditions safeguarding navigation. It is believed that a plan can be devised whereby both navigation and power development can proceed under satisfactory conditions, especially as power plants are operated suc-

cessfully at some of the dams in the canalized rivers at the present time. Such instances occur where dams and power plants existed prior to canal construction. In the case of the St. Lawrence River projects the State, although opposed to the improvement of the river for ocean-going vessels, is in favor of the water power development. At two locations the possible power development is about 1,000,000 horsepower at each location, one-half of which will be on the American side. Especial interest is attached to these projects, as they both involve the construction of very extensive structures involved in controlling the immense volume of the St. Lawrence amounting to over 200,000 c. f. s.

Niagara Projects

At Niagara, one project under consideration now, contemplates the using of water from the Maid of the Mist Pool below the Falls through about 80-foot fall of the Rapids. To accomplish this, it is planned to divert the water from the pool through tunnels underneath the cliffs, about 2 miles in length, and discharge into the River again below the Rapids. A second project in the Gorge contemplates the construction of a dam across Niagara Gorge below the Rapids, and utilizing the entire flow of the River, about 200,000 c. f. s. This plan would flood out the Rapids, one of the scenic features at the Falls. As an engineering feat, such a dam presents an interesting problem, both as to the tremendous quantity of water that is involved, and also in securing a foundation for the dam. At some locations in the Gorge, it has been found that there is nearly 200 feet of loose rock. In the recession of the Falls, quantities of rock have been deposited in the Gorge. Although these difficulties confront the project, it is too much to admit that modern engineering genius could not accomplish such construction. However, considerable investigation is desirable to disclose whether such a project would prove to be economical. All the water that can be diverted for power purposes at Niagara, permitted by Treaty, is being used at present. An effort is being put forward at the present time to increase the amount of the present diversion of 20,000 c. f. s. to double that amount.

History of Development at Niagara Falls

It is of interest to note the transition in the power development at the Falls. In some of the earlier plants the discharge was half way down the cliffs, or under a hundred foot head. In this early stage there was difficulty in designing machinery to operate under any greater head, so as to use the full fall at this point. Through improved machinery, not only is it possible to utilize the total head at Niagara Falls, but in the Chippewa Project, now near completion on the Canadian side, the plan is to utilize the total fall of both the Falls and the Rapids, or about 318 feet of head. High grade hydraulic turbines of today are designed along strictly scientific lines, supplemented by experimental data.

(Continued on Page 61)

ROAD CONSTRUCTION IN OUR NATIONAL FORESTS

A description of the various projects now under way under the supervision of the Bureau of Roads of the United States Department of Agriculture in cooperation with the Forest Service

By F. W. MILLS

Senior Highway Engineer, Bureau of Public Roads

During the past ten years, and particularly since the close of the world war, a great deal of space in the technical magazines, trade papers, and other periodicals has been devoted to the activities of the several state highway departments, not only as to the construction programs undertaken solely by the states, but also to the cooperative work undertaken by the United States Department of Agriculture through its Bureau of Public Roads. Comparatively little, however, has been said except perhaps locally, of the immense program undertaken by the Department of Agriculture through the co-operation of its Forest Service and its Bureau of Public Roads.

On July 11, 1916, Congress passed what may be known as the original Federal Aid Act, which in addition to providing for the expenditure of \$75,000,000 as an aid to the states in the construction of post roads, also made available \$10,000,000 at the rate of \$1,000,000 a year, "for the survey, construction and maintenance of roads, trails and projects lying in or partly in" our national forests. This Act was amended on February 28, 1919, to provide an additional \$9,000,000 at the rate of \$3,000,000 a year for three years. Furthermore, Senate Bill No. 1072, which passed Congress on November 3, 1921, and was approved by the President on November 9, 1921, carried an appropriation of \$15,000,000, making a total appropriation of \$34,000,000 available until expended.

From these appropriations it is apparent that Congress has fully realized the importance of improving transportation facilities within the forests. Timber protection and production, water conservation and live stock grazing are recognized as great potential resources, but the ever increasing demand for good roads, created by the automobile tourist, is a factor of tremendous importance. Denver, Los Angeles, Fresno, Sacramento, and numerous other cities, have taken advantage of their proximity to these national forests to establish recreational camps in or adjacent to the reservations. Many important state and interstate highways now under improvement or included in programs for construction in the immediate future, traverse the national forests, and it is seen that complete development of many state systems will be impossible until the forest links have been built.

There are approximately 14,000 miles of main state and county roads within the national forests still to be constructed, and in addition there is estimated to be about 13,000 miles of service roads. To adequately construct only the road bed for the 14,000 miles of state and county roads would require something in the neighborhood of \$150,000,000, so that in spite of the evident tendency of the Congress to be liberal with appropriations, it will be seen that in the main, for the present, forest road activities must be confined largely to the construction of graded roads of adequate width and to the provision for necessary drainage structures. Great care, however, is taken in the selection of the line and adjusting the grades, with a view to future development. Surfacing of a type determined by the purposes to be served, availability of suitable materials, etc., may be applied any time after the road has been graded. This policy of two phase construction, if it may be so termed, has been adopted in many of the states, in recognition of the fact that line, grade, and to a lesser extent, drainage, are the only really permanent features in road construction. The increased facilities for travel afforded by the graded road will also serve to stimulate public interest, which cannot fail of a positive demand for some type of rigid or semi-rigid surfacing. Backed by popular demand, funds for this purpose become easily available.

The initiative in the selection of the forest projects rests with the Forest Service. The projects are usually chosen with due regard to existing or contemplated state and interstate connections, and after weighing carefully the economic value of the development. The termini, and in a general way, the route, having been determined upon, the Bureau of Public Roads, upon the request to do so, will make the necessary survey, prepare the plans, and proceed with the construction. Upon the more important projects, where the cost is in excess of \$5,000 per mile, it is customary to advertise for bids for the construction and to formally award a contract. If, however, the bids are considered excessive, or where the cost does not exceed \$5,000 per mile, the Bureau may proceed with the construction upon a day-labor basis. In either event, the Bureau assumes entire

charge and accepts all responsibility for proper prosecution of the work.

The Forest Service prepares the necessary agreements with the local authorities, and these agreements in turn become the authority of the Bureau of Public Roads for action under the amounts stipulated. In order that the work may proceed along a definite line, the Forest Service prepares a program of the season's work in contemplation. Owing to altitude and in many cases to latitude, the actual construction season may be very limited, while the surveys and reconnaissance work may be carried on for some time prior or subsequent to the construction period. In this way estimates can be obtained upon which to let contracts sufficiently early to admit of construction work in July.

Administration.

Until the present year forest road work was administered directly from the headquarters of the Bureau in Washington through District Engineers located more or less centrally throughout the west. It was found that this long range administration was not conducive to the best results. The major part of the construction was in more or less inaccessible regions with poor railroad and mail facilities, so much so that a great deal of valuable time was lost communicating with District Engineers and they in turn with the resident engineers in the field. In order to obviate these difficulties, and to decentralize the administration, it was thought that the establishment of a regional office at San Francisco in which many of the questions arising could be decided would facilitate the work. The deputy chief engineer in charge of the regional office is given wide latitude in order to expedite the field work. The immediate direction of the work is vested, as heretofore, in the six District Engineers having headquarters at Portland, San Francisco, Denver, Missoula, Ogden and Albuquerque. These cities are also the headquarters of the District Foresters, so that close cooperation is obtained between the Forest Service and the Bureau representatives.

While the District Engineer is charged with the construction of Federal aid roads as well as the forest roads, there is assigned to him as his assistant an engineer having exclusive charge of the forest road construction within his district. Under him in turn work the chief of survey parties and resident engineers, and through him are submitted the necessary detailed reports not only as to the engineering phases, but also as to cost accounting.

Work Done in Past Two Years

Forest road construction during the years 1919 and 1920 was subject to the general depression which pervaded the country during those years. Great difficulty was experienced in obtaining labor, and contract prices jumped to such an extent as to render prosecution of the work uneconomical if not impossible. During the fiscal year 1921, however, there has been a surplus of labor together with a

general improvement in the financial situation. Contract prices were reduced to such an extent as to permit a advance in Federal road construction far greater than in any year since the beginning of the work. Over 700 miles, included in 67 projects, have been completed or brought to an approximate completion during the year.

Space will not admit of anything more than a cursory description of these roads, any one of which would be a source of inspiration to the lover of nature. There are several, however, which are worthy of special note, not only by reason of their scenic



RETAINING WALL ON THE SAN GABRIEL PROJECT

Note the wire holding the rocks in place.

value, but because of the relation they bear to the great arterial system of the states.

Projects in the Northwestern States

Beginning in the northwestern section of the country we have the "McClellan Pass" forest road through the Mt. Rainier National Forest of Washington. This project, approximately ten miles long, and completed last December, is designed to establish a link between the state trunk line running from Ellensburg southeast to Prosser and the road running from Tacoma north to Seattle. The original plans of this road contemplated nothing more than a graded earth roadway with appropriate drainage structures. It was estimated to cost \$182,000, or approximately \$18,000 per mile. The actual construction cost was slightly below this amount. The line goes through a very heavily timbered section with many long stretches of "benched" side hill work which tended to run up the cost sufficiently high to preclude the possibility of placing a surfacing of rigid or semi-rigid character. During construction a considerable amount of surfacing material was uncovered, and this was placed in the road within range of economic haul.

With the completion of the state and county system roads proposed or now under construction, it will be possible to go from Walla Walla or points further east directly to Tacoma or Seattle by way

of the Mt. Rainier Forest, skirting around Mt. Rainier, through the Mt. Rainier National Park, and giving easy access to the 48 square miles of glacier, ranging from 50 to 1000 feet thick.

In Oregon one of the projects of special note is included in what is known as the Mt. Hood Loop. The general route of the Loop is from Portland west around the south side of Mt. Hood and then north to Columbia River, connecting with the famous Columbia River Highway at Hood River. Upon this loop there are three sections of forest projects. The first, known as the Zig-Zag section, is 14.4 miles and was completed October 7, 1921. The second or Hood River section, 5.9 miles, is approximately 75 per cent completed, while the so-called Middle section of 17 miles is 25 per cent completed. The estimated total cost of these sections is \$910,000, for a total distance of 37.3 miles. Like the McClellan Pass road of Washington, this too is a 16-foot graded earth road with the necessary drainage structures. Besides forming a loop between Hood River and Portland, this road will connect at Government Camp with the proposed "Sky Line" route which runs south through Mt. Hood to the Crater Lake National Park. With the completion of this route and the few remaining gaps in the Columbia River Highway, we will have a route of scenic beauty unsurpassed.

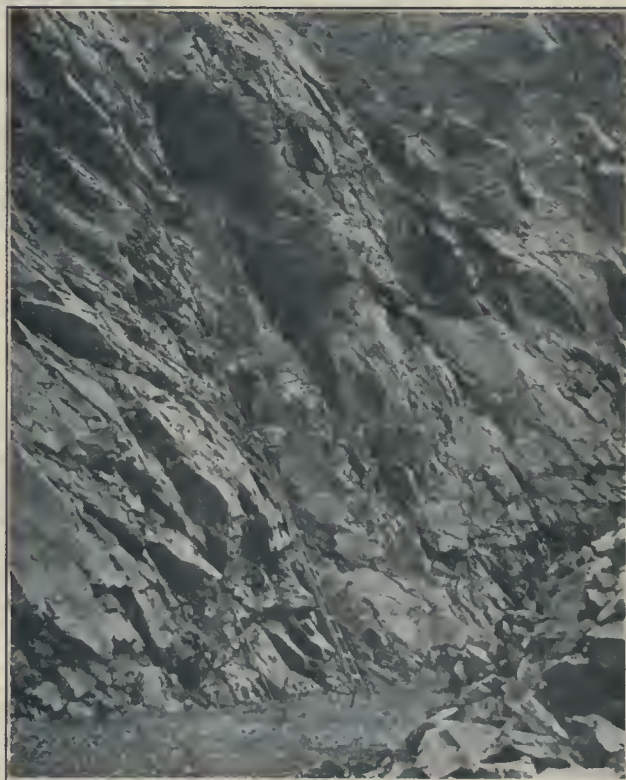
As an example of public appreciation of this road, it is interesting to note that a traffic census taken in July, 1920, showed that 2,000 automobiles had traveled the Zig-Zag section of the Mt. Hood Loop in a single day.

On the western side of Crater Lake National Forest there is a project recently completed which comprises a part of the Medford-Klamath Falls route through the Crater Lake National Forest, extending from Prospect to the edge of the park. This section is 22 miles long and connects with the national park road easterly, and on the west end will tie into state route 22. One section of state route 22 is already under improvement as Federal-aid post road No. 47. At Medford connection is made with the main east and west trunk line from Klamath Falls to Grass Pass. There is also upon this Medford-Klamath Falls road another small section of forest road just south of the Crater Lake Park, the Anna Creek section, just northwest of Fort Klamath. These two roads and their connections are designed with the idea of bringing us closer to what Joaquin Miller, the Sierra poet, termed "the sea of silence," the lake of mystery.

California Projects

Over the line in California there are several forest projects. Conspicuous among them is the Klamath River road in the Klamath Forest. This road follows in a more or less general way the grade of the Klamath River. It connects on the south with the proposed state highway to Crescent City, and

on the north forms a connection with the state highway to Yerba. While this road might be termed a "lateral", a glance at a map will show that it is an indispensable connection between the main road running north from San Francisco to Portland and the coast road at Crescent City. This road is approximately 49 miles long and is one of the longest of the forest projects. For construction purposes it was divided into eight sections. Something over 22 miles or about 40 per cent of the entire road has been completed. The total estimated cost of this project is about \$1,223,000, or about \$25,000 per mile. When it is considered that the topography encountered on this road was such as to require cross-sections to be taken at an average distance of 25 feet apart for the first 9 miles and 18 feet apart for the next 2 miles, the ruggedness of the country and im-



CROSS SECTION PARTY ON FINALS ON A SECTION OF THE SAN GABRIEL PROJECT

Note the man on the ladder on the right. This picture will help the reader realize the difficulties involved in this work.

ensity of the work involved can be appreciated.

It is now possible to travel south from Red Bluff, California to Los Angeles over what is probably the longest continuous stretch of hard surface roads in the entire United States. Then turning west toward San Bernardino we will find a short but exceedingly interesting forest project running northward from Azusa into the Angeles National Forest. The first 6½ miles of this, the San Gabriel Canyon road, has been improved by local forces intermittently during the last five years. This section is for the most part in fair condition, though possibly deficient in width

due to the failure to remove the slide. There are two places where the grades are excessive, running up to between 15 and 20 per cent. The road, however, has been added to the state system by Constitutional amendment of 1919; its betterment consequently may be expected in the very near future and will undoubtedly include a connection on the north with the San Gabriel Canyon project which will skirt around the south and west side of Mt. Islip, crossing the divide at an elevation of 6,500 feet, follow Rock Creek, and ultimately connect with the state highway at Palmdale. The general scheme, therefore, is to supply a cut-off over the San Gabriel Mountains for through traffic from the San Gabriel Valley and territory lying east of Los Angeles to the Mojave Desert and the north. Most of this territory is not accessible except to pack trains.

The plans for the San Gabriel Forest project proper now cover a length of $8\frac{1}{2}$ miles, but by reason of the seemingly excessive cost, only 1.4 miles have been constructed. This section has cost \$153,650, or about \$109,000 per mile. At first glance this may seem an unusually excessive cost, but considering that 75% of the excavation was in solid rock and that the rock cliff side hull cuts on portions of the work were 95 feet high and a through cut at the beginning of the project was 55 feet deep, we can gather some idea of the immensity of the work involved. Owing to the steep slopes, very little, if any, material would stand on the down side of the excavation, and it was found necessary to "bench-in" the line for the full supported width.

This section was not built on an actual cooperative basis with the state or county. There is, however, an agreement by which the state will improve the connecting sections. In view of the importance of the route in general, this cost was not considered uneconomical, and when completed will not be out of proportion to its material value. The accessibility of the San Gabriel Canyon and the Angeles National Forest gives it a particular value for camping and recreational purposes, not only for the tourist from Los Angeles and Southern California generally, but Azusa at the mouth of the canyon is but 24 miles from Los Angeles and on the line of the Pacific Electric Railway, so that the tramp is afforded almost equal opportunity with the automobilist.

Projects in the Rockies.

Colorado has for many years been a Mecca for the lover of the great outdoors. The U. S. Department of Agriculture, through its Forest Service and Bureau of Public Roads, has not been in the least backward in its endeavor to keep at least abreast of the demand for better road facilities. Travel within the Rocky Mountain National Park has been well cared for by the Department of the Interior, and in the national forests, the Department of Agriculture is doing its share in road development as far as the financial limitations will permit. In general,

the Colorado roads are unsurpassed for the stalwart nobility of the scenery along their routes.

Of the many forest projects in Colorado there is possibly none more interesting both to the layman and the engineer than the Berthoud Pass project in the Pike and Arapahoe National Forests in Clear Creek and Grand Counties. This road begins at Empire and runs northwest for a distance of 30 miles to Fraser. Empire at the eastern terminus is only 42 miles from Denver. To the engineer, the conspicuous feature of the Berthoud Pass project is its gradient and the altitude attained. A ruling grade of 5 per cent with a maximum of 6 per cent, the latter not to exceed 1200 feet in length has been obtained by several switchbacks and the Continental Divide is crossed at an elevation of 11,300 feet. The minimum radius of horizontal curvature is 50 feet. The work was all in very heavy side-hill excavation and practically no part of the old trail or wagon road was used. Excavation on this project was done almost entirely by steam shovels. The shovels were assembled at Empire. As soon as they had been tried out they were started under their own power for an eleven-mile climb to the work. The old Berthoud Pass road, very narrow and very steep, having grades as high as 24 per cent, was used. Considerable delay was experienced in transporting the shovels due to fire, rain, and passing traffic moving in the opposite direction. However, the shovels arrived safely at the end of a strenuous three weeks and were in a position to dig their way back. This feat in itself testifies to the resourcefulness and energy of the construction engineers. To the tourist, the route is interesting because it will render accessible another vast playground area as well as a connection which will ultimately be constructed through to Sulphur Springs, Middle Park and northwest to Steamboat Springs, or continuing directly northward into North Park and Walden. The completion of the state highway across Millner Pass will connect the circle trip by Denver, Estes Park, Millner Pass, Grand Lake, Berthoud Pass and Lookout Mountain. Traffic over the existing road is extremely heavy during the open season, averaging possibly 300 automobiles and trucks per day. Almost any day during the season cars bearing license tags from widely separated states may be seen. The Pass is usually open by the middle of June and remains free of snow until November. This admits of but a comparatively short tourist or working season. For the local residents it offers transportation facilities for hay and farm products to the Georgetown, Empire, and Idaho Springs districts.

The forests of Idaho, Montana, New Mexico and Arizona all have their proportion of road mileage and many interesting projects are under construction. Nor is the activity of the United States Department of Agriculture confined to the Rocky Mountain and Coast States. There are in the nation-

(Continued on Page VIII)

THE NEW YORK STATE LICENSE LAW

Professional Engineers and Land Surveyors Required to Obtain Licenses to Practice in New York State

By PROFESSOR S. G. GEORGE, C. E. '05

A law governing the practice of Civil Engineering and land surveying was given final approval by the Governor of the State of New York on May 5, 1921.

The provisions of this law have been given the usual newspaper publicity and have been featured in the engineering journals. However, the importance of the subject-matter and the vital relation of the law to the work of engineers together with a natural tendency to remain ignorant of the features of such a law warrant a synopsis of its main provisions for the benefit of alumni and students of Civil Engineering.

The act is a part of the general business law of the state, being in the amended form Article IV—A of Chapter twenty, Laws of 1909, sections 37 to 39-0. Section 37 contains the reasons for and the main provisions of the law, and reads as follows:

"Sec. 37. Engineers and Surveyors to be licensed. In order to safeguard life, health and property, any person practicing or offering to practice professional engineering or land surveying in this state shall hereafter be required to submit evidence that he or she is qualified so to practice, and shall be licensed as hereinafter provided, and **from and after two years after this act becomes effective it shall be unlawful** for any person to practice or to offer to practice professional engineering or land surveying in this state, unless such person has been duly licensed under the provisions of this act."

The parts emphasized by the heavy type indicate that the law will not be enforced until and after May 5, 1923. It will be necessary in all cases to take previous steps and to obtain license in order to minimize difficulties and to avoid imposition of the penalty.

The act next makes provision for a board of examiners, five in number, who shall be appointed by the regents of the University of the State of New York. Members of the board hold office for one, two, three, four or five years on appointment of the first members, and thereafter for five years or, in case of a vacancy, for the unexpired term. They must qualify by being citizens of the United States, residents of New York State at the time of appointment and must have been engaged in the practice of engineering for at least ten years and have been in responsible charge of work for at least five years. Their compensation is to be fixed by the regents and they are to receive allowances for traveling, incidental and clerical expenses.

After providing for the organization and meetings of the board, and for the handling of receipts and disbursements the act specifies the records to be kept of applicants and licensees.

The fee to be paid for license to practice professional engineering or to practice land surveying is twenty-five dollars. Such license must be renewed yearly on application and the renewal fee is one dollar. The fee is to be paid for license to practise both professional engineering and land surveying is thirty-five dollars; annual renewal fee, one dollar.

The board will issue license to practice professional engineering to any person who submits evidence of qualifications satisfactory to the board with the following provisions:

Applicant must be—

- (a) Twenty-one years old;
- (b) Of good character and repute;
- (c) Of four or more years of experience in the practice of professional engineering of a character satisfactory to the board.

Similarly, for land surveyor:

Applicant must be—

- (a) Twenty-one years of age;
- (b) A citizen of the United States, or under declaration of intention to become naturalized;
- (c) Able to speak and write the English language;
- (d) Of good character and repute;
- (e) Of three or more years of satisfactory experience.

Each two years of study in a school of engineering of standing satisfactory to the regents shall be considered as equivalent to one year of such active practice.

Unless disqualifying evidence be before the board, the following facts established in the application shall be regarded as *prima facie*, "evidence satisfactory to the board" that the applicant is fully qualified to practice professional engineering or land surveying.

(a) Six or more years of active engagement in professional engineering work, one of which shall have been in responsible charge of work, or in the case of applicants for license as land surveyor, four or more years of active engagement in land surveying work of a character satisfactory to the board.

(b) Graduation, after a course of not less than four years in engineering from a school or college

approved by the regents as of satisfactory standing, and an additional four years of active engagement in professional engineering, one of which shall have been in responsible charge of work, or two years of active engagement in professional land surveying of a character satisfactory to the board.

Further provisions cover mode of issuance of certificates, expiration and renewal of certificates, revocation and renewal of certificates, seals to accompany certificates of licenses, unlawful practice without license, for which the penalty is for a misdemeanor punishable by a fine of not less than one hundred dollars nor more than five hundred dollars, or by imprisonment for three months, or by both fine and imprisonment.

The final sections of the law are as follows:

Sec. 39-k. Exemptions. The following shall be exempted from the provisions of this act:

1. Offering to practice in this state as professional engineer or land surveyor by any person not a resident of and having no established place of business in this state.

2. Practice as a professional engineer or land surveyor in this state by any person not a resident of this state and having no established place of business in this state, when such practice does not aggregate more than thirty days in any calendar year provided that said person is legally qualified for such professional service in his own state or country.

3. Practice as a professional engineer or land surveyor in this state by any person not a resident of and having no established place of business in this state, or any person resident in this state, but whose arrival in the state is recent; provided, however, such a person shall have filed an application for license as a professional engineer or land surveyor, and shall have paid the fee provided for in section thirty-nine of this act. Such exemption shall continue for only such reasonable time as the board requires in which to consider and grant or deny the said application for license.

4. Engaging in professional engineering or land surveying as an employee or pupil of or under the direction of a licensed professional engineer or a licensed land surveyor, or as an employee or pupil of or under the direction of a professional engineer or land surveyor authorized by paragraphs two and three of this section, provided that said practice may not include responsible charge of design or supervision as principal.

5. Practice of professional engineering or land surveyor, solely as an officer or as an employee of the United States.

6. Practice of professional engineering or land surveying solely as an employee of this state or any political subdivision thereof, at the time this act becomes effective and thereafter until the expiration of the then existing term of office of such employee.

Sec. 39-l. Public work. Two years after this act goes into effect, no county, city, town or village or other political subdivision in the state, shall engage in the construction or maintenance of any public work involving professional engineering or land surveying for which plans, specifications and estimates have not been made by, and the construction and maintenance supervised by, a licensed professional engineer or land surveyor; provided, that nothing in this section shall be held to apply to such public work wherein the contemplated expenditure for the completed project does not exceed two thousand dollars.

Sec. 39-m. Land surveying. Land surveying for the purposes of this article means the survey of areas for their correct determination and description, and for conveyancing when that is involved, or for the estab-

lishment or re-establishment of land boundaries and the plotting of lands and subdivisions thereof.

Sec. 39-n. Professional engineering. A person practices professional engineering within the meaning and intent of this article, except as hereinafter stated, who holds himself out as able to do, or who does, the work that an engineer does in the planning, designing, constructing, inspecting and supervising of engineering work, or appliances involved in public or private projects, or in making investigations for proposed engineering projects.

Sec. 39-o. Construction of this article. Nothing herein shall apply to a corporation, partnership or joint-stock association, provided the person or persons carrying on the actual practice of engineering on behalf of such corporations, partnerships or joint-stock associations shall be licensed engineers and nothing in this article shall be construed to apply to the preparation or execution of designs, drawings, plans, or specifications for the construction or installation of machinery or apparatus constructed or installed by the corporation, partnership or joint-stock association preparing such designs, drawings, plans or specifications if the supervision of the preparation of any such designs, drawings, plans or specifications, construction or installation shall be under the general direction of a licensed engineer, and nothing in this article shall be construed as prohibiting licensed professional engineers from making land surveys, where such surveys are essential to engineering projects, nor as prohibiting any person from surveying land in parcels more than one acre in area when the same is not within the boundaries of cities or incorporated villages, provided such person does not represent or hold himself out as being a licensed land surveyor.

Sec. 2. All laws or parts of laws in conflict with the provisions of this act are hereby repealed.

Sec. 3. This act shall take effect immediately.

The following comment may be of interest. It appears that the law governing the licensing of engineers is strict, and the penalty for violation drastic. The power placed in the hands of the regents of the University of the State of New York is so complete that experience with the operation is necessary to indicate how their decision on what is a school or college of satisfactory standing and the decision of the examining board on what is satisfactory engineering experience will be received by applicants for license, and by the faculties of engineering schools.

The law evidently favors and tends to protect older members of the engineering profession and older engineering firms from competition which they have experienced in the past and consequently requires inexperienced or young members, especially recent graduates, to enter the employ of licensed engineers or firms or to enter the employ of the government of the United States if employed within the boundaries of New York.

On the other hand the law will require corporations to employ licensed engineers to supervise work of an engineering nature.

Finally, it should be remembered that other states have adopted similar laws, and experience under the operation of such laws should be of value in determining how the law will affect engineers in the state of New York.

ALUMNI NOTES

'89. Cornell Civil Engineers will be interested in the following item taken from the Northwestern University Alumni News for December, concerning Professor John F. Hayford: "After eleven years of research, backed by the Carnegie Institute of Washington, Professor John F. Hayford, director of the School of Engineering at Northwestern University, has announced the virtual discovery of the laws controlling the evaporation of the Great Lakes, upon which, he said, depend the questions of regulating lake levels, developing water power and draining great cities of their sewage. 'It took us a decade,' said Professor Hayford, 'to discover the evaporation problem, which can be explained as one involving the slopes of the lake surface caused by the wind and based upon the various barometric changes. I think that in another year we shall have reached the goal. Then the whole Great Lakes problem, including water power at Niagara and the amount of water that can be used by Chicago on its drainage canal, will be easy of solution. It might follow that the lake levels can be actually regulated.'"

'90. Thomas McE. Vickers, Secretary-Treasurer of the Syracuse Dry Goods Company, Syracuse, N. Y., and of the Cato Mercantile Company, Cato, N. Y., was one of the organizers of the new Syracuse Hub Corporation, a company to hold and deal in real estate in the City of Syracuse. Vickers is treasurer of the corporation. His address is 200 S. Clinton Street, Syracuse, N. Y.

'92. Ernest H. Baldwin gives his present address as 315 South Street, Springfield, Mo., having moved there from Cornwall-on-Hudson.

'92. Charles H. Clark is with the Cleveland Railway Company, Hanna Building, Cleveland, O.

'96. Erwin E. Haslam is a Civil and Mining Engineer in Wilkesburg, Pa. His home is at 443 South Avenue.

'01. '10. At the meeting of the American Society of Civil Engineers on November 16 and 17, John F. Skinner '01 spoke on "Stream Pollution and Sewage Disposal," and Carl A. Holmquist '10, spoke on "Water Supply and Water Purification."

'04, '05, '07, '08, Grad. The Cornell Alumni News for November 24 mentions the paper entitled "The Orbit and Spectrum of H. R. 8803," by Professor Samuel L. Boothroyd. This paper appeared as one of the Publications of the Dominion Astrophysical Observatory. (vol. 1, no. 25.)

'04. Ross M. Riegel is Engineer with the West Penn Power Company, 14 Wood Street, Pittsburgh, Pa. His home is in New Cumberland, Pa.

'07, '10. Harold L. Metzger and Park L. Metzger are members of the Metzger Construction Company,

which recently contracted to erect two new school buildings for the City of Buffalo. Their business address is 676 Genesee Street, Buffalo, N. Y.

'07. Clare D. Murray is a Contractor on State Roads. He lives at DeRuyter, N. Y.

'09. A son was born on October 29 to the Rev. and Mrs. Hiram Grant Conger, at the Wesley Hospital, Chicago. He has been named Franklin Elliott.

'09. William G. Gridley has just finished some concrete road construction at Rockwell Field, and at present is acting as Superintendent of Construction on two new airship hangars at the Army Balloon School at Ross Field, Arcadia, Calif. Gridley is an engineer with the Construction Service of the War Department. His address is 218 N. Myrtle Street, Monrovia, Calif.

'09. Norman E. Hildreth is Vice President of J. R. Hampson & Company, Inc., General Contractors, 184 North Street, Pittsfield, Mass. His home address is 46 Waverly Street.

'10. Herbert H. Conway is an engineer and general contractor at 128 Market Street, Newark, N. J.

'10. Herbert S. Fairbank is Senior Highway Engineer with the Bureau of Public Roads and is Editor of the magazine, "Public Roads." He lives at 2041 East Thirty-second Street, Baltimore, Md.

'10, '16. The President and Secretary of the national organization of Phi Tan Phi, honorary scholastic society of the Republic of China, which has just been formed, are Cornell graduates, according to a recent article in the North China Star, of Tientsin. Chung Chen Lo '10, President of Tangshan Engineering College is President of the national council, and Professor Joseph H. Ehlers, '16, of Pei Yang University, is Secretary. This society is to be similar in aims and activities to the Phi Beta Kappa and Sigma Xi societies in the United States. Chapters have been established in most of the Colleges and Universities of China.

'11. Major Octave De Carre, C. A. C., has been transferred from Fort Hancock, N. J., to Fort Monroe, Va.

'12. Thomas W. Blinn is a designer of special work with the Department of Street Railways, City of Detroit, M. O. Lines. He may be addressed at 749 Crawford Avenue.

'13. Meyer Hofstadter is Contracting Engineer with McClintic-Marshall Company, 50 Church Street, New York City.

'13. Charles T. Wanzer is Resident Engineer for the Southern Power Company of Charlotte, N. C., on the construction of hydro-electric power plants. The company has recently completed a 100,000 H. P. plant near Camden, S. C., and has begun preliminary

work for the construction of a new plant at Great Falls, S. C.

'13. Miss Kathryn Droege and Theodore Ladd Welles, Jr., '13, were married on October 15, at the home of the bride's mother, 2713 Lancashire Road, Cleveland Heights, O. Mrs. Welles is a graduate of Western Reserve University, '18. Welles is with the Crowell & Little Construction Company, of Cleveland, O.

'14. Paul L. Heslop is a partner in the J. B. Campbell Company of Philadelphia. The company sells hydro-electric equipment and has offices in the Bonrse Building.

'14. Joseph A. W. Iglehart, formerly a member of the firm of Brooke, Stokes and Company, announces the formation of J. A. W. Iglehart and Company, for the purpose of dealing in investment bonds. The offices are in the Title Building, Baltimore.

'14. Van Wyck W. Loomis is a Stock Salesman in New York City. He may be addressed care Bell Telephone Securities Company, 195 Broadway, New York City, or at Attica, N. Y.

'14, MCE '15. The Alumni News recently published a review of Hool and Whitney's (C. S. Whitney '14) Concrete Designer's Manual, which is meeting with much approval in engineering circles.

'15. Edward A. Batley has changed his address to 1026 Second Avenue, North Troy, N. Y.

'15. Carl C. Cooman was a visitor at the Cornell Civil Engineer Office recently. Cooman was Editor-in-Chief of the publication in 1915. He is Assistant Engineer with Shields Engineering Co. of Chicago, on Sanitary Work.

'15. William Lavine is a Builder and Contractor at 9110 Lefferts Avenue, Richmond Hill, N. Y. He lives at 253 Tompkins Avenue, Brooklyn, N. Y.

'15. Charles F. Radford is a Civil Engineer working on State Highways in Michigan. He lives in Hermansville, Mich.

'15. Edward J. Thomas is now with the Development and Construction Company, Engineers and Contractors, of Baltimore. He lives at E-5 Avon Apartments, 6 East Read Street, Baltimore, Md.

'15. David W. Townsend has returned from Honolulu, T. H., and is now with the Iowa Highway Commission, Sioux City, Ia.

'15. Alan F. Williams and Murray N. Shelton, '16, played football during the past season, with the Olympic Club of San Francisco which held the University of California "Wonder Team" to a 14-0 score. Shelton is with the American Radiator Company, and Williams is located in Sausalito, Calif.

'16. Abram F. Bacharach is a teacher in the engineering department of Baltimore Polytechnic Institute, Baltimore, Md. He lives at 800 Reservoir Street.

'16. Captain Gerald E. Brower, who is a student officer in the Air Service Field Officers' School

at Langley Field, Va., gives the following personal news: "Was Adjutant of the Field Officers' School all last year, and Chief of G 1 Section, Provisional Air Brigade, here this summer during the bombarding maneuvers against naval vessels. Very interesting work, and of course makes me more than ever a fanatic about flying and everything connected with it."

'16. James A. Cooper, Jr., is in the engineering department of the New York Telephone Company. His home is at 426 Fifty-sixth Street, Brooklyn, N. Y.

'16. Henry A. Foster is with William Barclay Parsons, Consulting Engineer, 84 Pine Street, New York City.

'16. Robert S. Meston is in Johannesburg, South Africa, representing the Standard Oil Company of New York.

'16. Colonel and Mrs. Girard Sturtevant have announced the engagement of their daughter, Marjorie, to Captain Gilbert E. Parker. Parker is with the 49th Infantry at Fort Snelling, Minn.

'17. A daughter, Marjorie Kingsland, was born on October 11, to Lieutenant (j. g.) Robert E. Bassler, C.E.C., U.S.N., and Mrs. Bassler of Washington, D. C. Bassler says if he is still stationed in the United States in 1938, he hopes to see their daughter registered with the class of 1942, provided Cornell is still coeducational.

'17. Mr. and Mrs. Ellsworth L. Filby have moved to 1319 Bull Street, Columbia, S. C., and would be glad to see Cornellians down "that-a-way." Filby is State Sanitary Engineer with the State Board of Health.

'17. Vincent J. Paecello is with Elwyn E. Seeley, '04, Consulting Engineer, 101 Park Avenue, New York City.

'18. George P. Bullard is with the McClintie-Marshall Construction Company in the engineering department. He lives at 123 North Negley Avenue, Pittsburgh, Pa.

'19. Morris W. Herriman is Chief Engineer, Stanford Oil Company, Field Superintendent of the Tennessee-Montana Leasing Syndicate and General Manager of the Sarpy Development Company. He lives at 320 North Franklin Avenue, River Forest, Ill.

'19. Floyd W. Hough is in charge of a precise level party in and near the Grand Canyon of the Colorado River.

'19. Percy S. Wilson is Assistant Resident Engineer at the Harrisburg Water Works Extension, 213 North Second Street, Harrisburg, Pa. Harry C. Campbell, '14 is the Superintendent for the Contractor on the same job. Wilson was recently elected a Junior in the American Society of Civil Engineers.

'19, MCE '20. Chilton A. Wright is with William Barclay Parsons, 84 Pine Street, New York City, doing hydrology work in connection with the rainfall of the state.

'20. Nathan H. Baier is in general civil engineering practice with Carr and McFadden, Engineers, West Palm Beach, Florida.

'20. Robert V. Clapp is with the Concrete Reinforcing and Engineering Clapp Company, Cleveland, Ohio.

'20. Fred C. Griffith has changed his address from Utica, N. Y., to the Y. M. C. A., Summit, N. J. He is with the New York Telephone Company.

'20. Bernard J. Harrison is Sales Engineer for the Van Dorn Iron Works Company of 318 Broadway, New York City.

'20. Alger E. Hunkin gives his business address as 6th Floor, Century Building, Cleveland, O. His home address is Lakeland Ave., corner Clifton Blvd.

'20. Vincent B. Lamoureaux is Assistant Engineer in the water resources branch of the U. S. Geological Survey, and may be found during the day at Orton Hall, Ohio State University, Columbus, O. Lamoureaux expects to be stationed in Columbus for at least two years. His address is 1313 Forsythe Avenue.

'20. Wilbur O. Manchester is a Deck Officer in the U. S. Coast and Geodetic Survey, Washington, D. C.

'20. A Van Duzer Wallace, Jr., is a Civil Engineer with the Foundation Company, which is doing the construction for the Union Gas and Electric Company of Cincinnati. He lives at 1105 Elm Street, Cincinnati, O.

'20. Charles C. Woodruff, Jr., is Assistant to General Superintendent for the C. C. Woodruff and Company. His address is Forest Hills, N. Y.

'21. Robert C. Kennedy is an Assistant Engineer with the New York State Highway Department, 284 Court Street, Rochester, N. Y.

'21. Alvin S. Lehman is Superintendent at the Federal Warehouse Company, Peoria, Ill.

'21. J. H. C. Martens is an Assistant in the Geology Department and is taking graduate work. He resides at 205 Dryden Road, Ithaca, N. Y.

'21. Herman P. Odessey is engaged in precise traverse work in Wisconsin with the U. S. Coast and Geodetic Survey.

'21. Waldemar Polaek has left the Fegles Construction Corporation of Minneapolis, and is now with the Arundel Corporation of Baltimore, which is engaged in removing Diamond Reef, East River, N. Y. He lives at 201 E. 33rd Street, New York. Arthur Deagon, '21, is doing the same work.

'21. Anton A. Pregler is employed as checker on an electrical survey of New York City which is being made by the New York Edison Company. His home address is 859 Main Street, Stamford, Conn.

'21. William W. Wannamaker is with the South Carolina Highway Bridge Department on the construction of a bridge across the Savannah River at

Augusta, Ga. His address is 966 Heard Ave., Augusta, Ga.

'21. Edward L. Duffies returned to Ithaca December 9, and while in town looked the old bunch up. Quite a session in the materials lab discussing old times.

NEW MAILING ADDRESSES

'73 T. Sidney White, 837 North Seventh Avenue, Tucson, Ariz.

'79 James C. Kennedy, R. F. D. 3, Box 124, Sacramento, Calif.

'83 John C. Beye, 1901 D Street, N. W., Washington, D. C.

'90 Thomas McE. Vickers, 200 S. Clinton Street, Syracuse, N. Y.

'92 Ernest H. Baldwin, 315 South Street, Springfield, Mo.

'96 Erwin E. Haslam, 443 South Ave., Wilkesburg, Pa. Joseph C. Hilton, 8 Larehmont Court, Larehmont, N. Y.

'07 Ralph J. Ferris, Sinesville, Pa.

'08 J. Wright Taussig, Booth & Lydecker Streets, Englewood, N. J.

'09 Albert Diamant, 2 Marble Hill Avenue, New York City. Norman E. Hildreth, 46 Waverly St., Pittsfield, Mass.

'11 Ralph S. Crossman, 412 West Elm Street, Urbana, Ill. Henry P. Schmeek, Box 225, La Salle, N. Y.

'12 Morris L. Kaufman, 1145 Carroll Street, Brooklyn, N. Y.

'14 Edward A. Batley, 1026 Second Ave., N. Troy, N. Y. Van Wyck W. Loomis, Attica, N. Y.

'15 Ross G. McClure, 208 N. Carolina Street, Chicago, Ill. I. William Lavine, 253 Tompkins Ave., Brooklyn, N. Y.

'16 Abram F. Bacharach, 800 Reservoir St. Baltimore, Md.

'17 Ellsworth L. Filby, 1319 Bull Street, Columbia, S. C. Jacob Fruehtbaum, 609 Mutual Life Building, Buafflo, N. Y. Vincent J. Pacello, c/o E. E. Seelye, 101 Park Ave., New York City. James K. Van Campen, Jr., 308 N. Clinton Street, Olean, N. Y.

'18 Geo. P. Bullard, 123 N. Negley Ave., Pittsburgh, Pa. Frank V. Fields, 21 Serrell Ave., Binghamton, N. Y.

'20 Eduard Fritz, Jr., 2516 Winthrop Ave., Chicago, Ill. Alger E. Hunkin, Lakeland Ave., Corner Clifton Boulevard, Cleveland O. Vincent B. Lamourenx, 1313 Forsythe Ave., Columbus, O.

'21 Michael G. Sullivan, 334 Garson Avenue, Rochester, N. Y. Manuel V. Zabat, 165 E. Third Street, Mount Vernon, N. Y.



SCHOOL NOTES

Note: In an attempt to make the magazine of more interest to the students, the Board has deemed it advisable to institute this new department of School Notes. In order to make this new feature successful we must have student contributions to the School Notes Department. Choice morsels of class witticisms, accounts of interesting happenings in class or laboratory and a profusion of them, will make the School Notes a successful department. But, we repeat, we depend on student co-operation. If you heard "a good one" in class write it up and mail it to the School Notes Editor or drop it in the Civil Engineer's contribution box which is located over the table in the ante-room of Director Barnes' office. The following is an example of the sort of material we would like all of you to contribute to the magazine.

A FABLE

We were amazed to read in blazing headlines of a well known Ithaca newspaper that Professor John Perry (in spite of his recent promotion we can't help but call him "Johnny") was "shot" and wounded out on railroads on Monday morning, November 7. Upon investigating the matter further we found that some young, enterprising cub reporter with true journalistic instinct had exaggerated the report about ten fold. Our technical training spurred us to get the accurate facts in the case. We found out that what really happened was as follows: "Huek" Bosworth and "Johnny" Perry were out on location with a transit party. Both were standing near the instrument. Suddenly, and without warning, "Huek" wheeled around, kicked his right (or left) foot in the air and caught "Johnny" right in the left knee with the heel of his right (or left) boot. We haven't been able to find out what it was that "Johnny" really said but we leave it to your imagination. "Huek" was very sorry and asked if "time out" hadn't better be called. But the work went on just the same and "Johnny" came in that night with a limp. Moral: "Don't believe everything you read in the newspapers."

MEETING OF THE CORNELL SOCIETY OF CIVIL ENGINEERS

The second meeting of the Cornell Society of Civil Engineers was held at Barnes Hall, December 2, 1921. A short business session started the meeting. President Tom Finn read the new constitution of the association, and a motion was made and carried to adopt the constitution as read. This closed the business meeting and the conduction of the meeting was turned over to Thompson. After telling several jokes supposedly new and personally vouched for by himself, Thompson announced Professor Barnes as the next speaker.

Professor Barnes gave a short talk about the new student chapter of The American Society of Civil Engineers that has been instituted at Cornell. He told us of the many privileges that had become available through the chapter being brought here, and hoped that many of us would take proper advantage of them. Spurney next gave several poems which were very well received, especially the one on the opera "Tosca."

Professor "Connie" Conwell who is our athletic director, read a short report on last year's activities, and called for more volunteers for this year's athletic teams.

Professor Dawson, a newcomer in our faculty, was the last speaker of the evening, and contrasted the rise of civilization with the advance in the science

C. E. ATHLETICS

This year C. E. must make a better record in intercollege athletics. There is no alternative. Last year, Law and Architecture gave us a very close race for last place.

We have made a better start than last year but there is still much to be done. We now have a good chance for first place in basketball provided that enough come out and continue coming out and practicing conscientiously and regularly. Watch the Association bulletin board for time and place of practice and games. Practice is now scheduled for every Saturday at 4:30 in the New Armory, but this may be changed.

Since Prof. Conwell said in the last Association meeting, "We are not averse to having a few spectators at the intercollege games," those who do not play basketball know wherein their duty lies. Rooters at games are just as necessary as the team, in order to insure victory.

of hydraulics. He discussed as fully as he could under the limited time allowed, several of the recent hydraulic projects for the development of water power, that had been undertaken in Canada. The discussion was very well received and beyond doubt a new interest was borne to many who thought that hydraulics was merely something with which to burden the student in his Junior Year.

Considering the nasty weather and the poor night for such a meeting, it was very well attended and a very enjoyable time was had by those who were present.

REPORTED BY B. V. D.

Section A completed its Railroad line on Monday, November 28. At noon a little reunion was held around the family camp-fire. All lamented with tears in their eyes the completion of their task. Refreshments were served (everyone brought his own lunch and Professor Perry helped out by distributing dill pickles to the boys to cheer them up). "Bill" Burnistroff was on the program for a stunt but had to cancel his act because as he explained "All the good jokes I know are in Russian."

LINE!

They needed a man with a true eye, a man who had an eye like the line of collimation of a transit as an assistant linesman (the man who handles one end of the ten-yard chain) on Schoellkopf Field. So they came over to C. E. where men are trained for such eyes. And when they got into Lincoln Hall they decided that they'd need a man who could run and one who was known never to fall asleep on the job because the Big Red team made first downs so fast that the linesmen had to be alert and on the jump to keep up with the pigskin. So they looked around (they, meaning of course, The Athletic Association) and they selected none other than "Huck" Bosworth. So now, dear readers, you know the identity of the short, well-built young man who has been carousing up and down the sidelines during the past-season football games. We nearly forgot to mention his everlasting pipe. "Huck" says that in the near future he's going to write a book on "The Theory and Practice of the Accuracy required in the

Art of Alignment in the Modern Collegiate Game of Football."

WE'RE BRIGHT, WE ADMIT IT

Professor C. L. Walker has discovered that the students in the college today are about 8.4% brighter than those in the college taking the same course in 1912. At least this is his conclusion after giving his class a prelim originally given in the same course in 1912. On the other hand Professor Ogden however claims that these conclusions are brought about because Professor Walker is getting old and becoming easier in his marking. Personally after hearing one recitation of the class we are inclined to side with Professor Ogden, for we heard that "a Drop Manhole is one where you drop the lid in place" and a few minutes later "that a Lamp-Hole is a hole you let a lantern down to see where the sewer is."

HONOR COMMITTEE ELECTIONS

The following were elected to the honor committee last spring and this fall:

Seniors—	T. D. Finn, Jr., '22
	J. S. Hannigan '22
	D. L. Copeland '22
	S. Burns '22
Juniors—	T. Telfer '23
	W. Rollo '23
	B. H. Palmer, Jr., '23
Sophomores—	E. F. Buckley '24
	F. K. Lovejoy '24
Freshmen—	W. W. Buckley '25

REMINISCENCE

"Nick" Pregler, C. E. '21, otherwise known as the Count, now an alumnus of Lincoln Hall, was seen down at the Columbia football game without a girl at his side. The boys of the class of '23 who spent their summer vacations last summer in the well-known and world-famous summer resort of Kings Ferry-on-Cayuga-Slope are wondering if "Nick" isn't a bit inconsistent now that he has become an alumnus. Maybe New York girls aren't as classy as those in Kings Ferry. How about it, Nick? (We hope he is affluent enough to subscribe to the C. C. E. just so as he can read this.)



UNIVERSITY NOTES

SUMMARY OF 1921 FOOTBALL SEASON

Rolling up a total of 392 points the Big Red Team capped its 1921 season by defeating Penn, 41 to 0, thereby finishing the first undefeated season since 1915. Not only did the Varsity roll up the highest number of points of any team in the country, but in Kaw, left halfback, it has the highest individual point gainer in the East. In the eight contests the Red and White eleven broke four seasons' records. Besides annexing the premier game score of 110 to 0 in the game with Western Reserve, Kaw totaled the largest number of touchdowns, crossing the goal 13 times, and Hanson booted the oval between the bars for 38 points.

While several of the varsity players will be lost through graduation, Coach Dobie will have most of his players eligible next year. Captain Dodge, Lechler, Olney, Jones, Brayman and Baker have played their last game with the Red and White.

After an intensive preliminary practise season the Varsity opened its 1921 season by defeating St. Bonaventure 41 to 0. The following week the University of Rochester eleven invaded Ithaca and was sent home dragging the small end of a 55 to 0 score.

On October 15 the Varsity humbled Western Reserve to the tune of a 110 to 0 score. The contest developed into a track meet shortly after the blowing of the first whistle. The backfield showed a drive that mowed down the lighter opposition like chaff in the face of a wind.

The following week Colgate was the next victim. Colgate was determined to avenge the 42 to 6 beating sustained the year before. They bucked up against an obstinate line and a charging backfield that plowed through their line and ran their ends almost at will, and departed for Hamilton dragging a 31 to 7 defeat with them.

On the heels of this victory the Green and White of Dartmouth came down from New Hampshire and in a furious battle the Varsity beat them to a pulp by the score of 59 to 7. The contest was much closer than the score indicates, and the Red and White scored one of its most notable victories of the season.

Before 16,000 persons the Varsity upset all dope, opening huge holes in the Dartmouth line, running their ends in an uncanny manner. The big 'Red Tank' started smashing the opposing line and had them on the run the entire game. The line and backfield coordinating perfectly, the team advanced the ball down the field almost at will.

On November 5 the Red and White traveled to New York and by using straight football tactics humbled Columbia by a 41 to 7 score. Before 20,000 people the Dobie machine riddled the Columbia line and ran the ends at will, while Kaw made a 70 yard run through the entire opposition.

In a blinding snowstorm on a field turned into a morass of mud, the Varsity defeated the strong Springfield aggregation, by the close score of 14 to 0. Aerial work was almost impossible due to the ball being thickly plastered with mud, and the straight Dobie tactics of crushing the opponents' line again came to the front.

With a week and a half before meeting our ancient rival, Penn, the Red and White warriors settled down to intensive scrimmages, determined to revenge the defeats handed Cornell by the Red and Blue. In six years the Varsity had not been able to take a game from the Quakers, and this year they were bent on a double purpose, that of beating Penn, and maintaining their unblemished season's record. On Thanksgiving Day the Big Red Team journeyed to Franklin Field, and in a rainstorm, on a field covered with mud, humbled Penn by the crushing score of 41 to 0, the largest victory ever gained over the Quakers by a Cornell eleven. Long, lean, barren years of disaster were thus atoned for, years of Penn victories were forgotten on that day and Cornell fans who witnessed the contest will never forget the superiority of the Varsity in every phase of the game. Working like the well-drilled machine that it was, the Varsity plowed its way from one end of the field to the other, beating down every defense offered by the Quakers, and in winning this contest established its right to one of the premier positions in the football sun.

AN OPEN LETTER

Alumni:—

Although the School is receiving practically no applications for men at the present time, there are indications that much new work will be taken up in the Spring, and that the demand for Civil Engineers will again become active. The School desires to assist Cornell Civil Engineers in every way possible but must have information concerning their availability and desires.

It is planned to have each department recommend men for its special line of work though most of the correspondence will be handled through the office of the Director so that requirements may be met promptly. The need of promptness is so great that there is little use in publishing information concerning openings in the Cornell Civil Engineer as it appears only once a month.

All the men desiring positions or change of work or location are urged to let me know their desires, including salary expected, within the next two or three months, as some organizations are already planning for the next season's work. It is especially urged that those not satisfied with their present work do this; as it is hoped that opportunities may arise of improving the positions of Cornell Civil Engineers and the necessary information for taking advantage of them should be at hand. The highest success is rarely attained unless one is engaged in work which is congenial and interesting to him.

Alumni needing engineering assistance or hearing of openings for engineers are also requested to submit such information, thus giving us a chance to recommend some Cornell Civil Engineer. In this connection I would be glad to receive frank criticism of recent graduates from the older employing alumni as we have no desire to recommend men for positions which they cannot fill. Of course, we endeavor to weed out those who have not at least the makings of a good engineer in them during the college course, but we are not always successful. Furthermore, such criticism would be of great value to us in judging the quality of our present product and might lead to the discovery that our present curriculum is not exactly what it should be in order to produce the best results.

Hoping for the co-operation of all Cornell Civil Engineers in these worthy purposes, I am,

F. A. BARNES,
Corresponding Secretary.

THE PRESENT STATUS OF WATER POWER DEVELOPMENT IN NEW YORK STATE

(Continued from Page 48)

Modern turbines compare in excellence of workmanship with the high grade steam engines. The speed regulation, so important in hydraulic turbines, has been improved so as to excell similar regulation devices used in ordinary steam practice.

With the difficulties of developing power under

high heads solved, future development at the Falls will doubtless be based on utilizing the entire fall. In fact, the Federal Commission has already gone on record as limiting further development, when possible after an increased diversion is authorized, to plans based on an **over all** development utilizing the entire head available.

The Chippewa Project

The project of the Hydro Electric Commission of Ontario, Canada, known as the Chippewa project, the first units of which are planned to be started this winter, will be the greatest water power development in the world, when in full operation. The installation consists of nine 55,000 horsepower units. This project well illustrates what is possible in hydro-electric development at the present time, when a large drainage and concentrated head exists, and a growing and extensive market for power is available, especially by means of the modern transmission lines.

The most important projects involve the rights of State and, in some cases, the Government. Such projects are to be licensed, so that the public interests are to be guarded. This supervision not only takes into consideration the payment of a fair rental value when public rights are concerned, but the recaptures of the project under certain conditions. By reason of the licensing method, projects that involve the using of public rights, obtain a standing that encourages the investment of capital and permits more economic development than would exist without as definite an understanding.

Combination of Developments

Realizing the importance of water power in maintaining a satisfactory industrial development, another public undertaking is being carried out in making a super-power survey of a large zone comprising the North Atlantic States from Maryland to New Hampshire, including the Eastern section of New York State. Such studies no doubt will continue throughout this country in order to show what power sources can best be connected by transmission lines as to secure the greatest economy in pooling power. One instance will illustrate such possibilities. Take for example, hydro-electric development that has not sufficient load at night to utilize all the available power, due to the closing down of daytime customers in the vicinity. Such a plant, connecting into a system requiring night service, such as the lighting of a large city, has an opportunity of using its excess night power that might be otherwise wasted in substituting steam power which it is assumed is used in night service referred to.

The public water power acts recently passed have advanced the possibilities of additional water power development to a very substantial extent. A large field is open to engineers in bringing about additional development so that this Country can keep pace with the industrial growth and maintain the position this country occupies in world affairs.

ROAD CONSTRUCTION IN OUR NATIONAL FORESTS.

(Continued from Page 32.)

al forest preserves of Alaska, constructed or under construction, 62 miles of forest roads.

Projects in the East

In the east the demand for facilities within the forests is being felt with equal force. In the Savannah Forest, so situated in northeastern Georgia, Northwestern South Carolina, and southwestern North Carolina as to embrace portions of these three states, we have the Three-State Forest Project, beginning at Mountain Rest in South Carolina just over the Georgia line and running northward into the highlands in North Carolina. On its southern end, at Mountain Rest, connection is made with South Carolina post road project No. 38 eastward to Seneca. This latter road is part of the main trunk system of the state. Southward it also has a connection to Walhalla, and thence over the Georgia trunk line to Atlanta. Upon its completion this road will no doubt become a popular link through the mountain regions of the south.

In North Carolina there is within the confines of the Pisgah Forest the Bennet Gap road running around the south side of Black Mountain, following in part the Davidson River. This road is reached from the Pisgah Forest station on the Southern Railway, and will make easily accessible that comparatively little known but none the less beautiful section in the mountains of western North Carolina.

On the west side of the mountains, in Tennessee, there is the Bristol Forest road extending from the south fork of the Hoston River just east of Bristol southeasterly by way of Mountain City and Shown Cross Roads to the North Carolina line near Deep Gap. At Bristol there is a connection with the main trunk line of Tennessee westward, and the eastern end projects which are in contemplation will insure connection with the system of North Carolina. In this way an east and west line across the mountains is being systematically coordinated.

In Virginia there has recently been let a contract which provides for the construction of the James River National Forest project. This road is virtually a link in the state trunk system extending northwest from Lynchburg. The project lies between Snowden and Glasgow, and will be of great interest to those contemplating a visit to the Natural Bridge.

No attempt has been made to go into a complete review of the cooperative work of the Department of Agriculture in the construction of forest roads, but rather in a more or less sketchy way it is the purpose of this article to develop the fact that real roads are being constructed in a real way, and to draw as clearly as possible the line between road **improvement** and road **construction**. There is little or no analogy between the problems confronting the engineer upon forest road construction and those

(Continued on page X)

INDUSTRIAL LIGHTING CODES.

In order to protect workers from accidents and eye sight damage, no less than five states, New York, New Jersey, Pennsylvania, Wisconsin and Oregon have now in force lighting codes for industrial establishments. Other states are now considering the adoption of an industrial lighting code, and it seems only a question of time when all the states will adopt such a code.

Proper lighting of work places is not only of great importance to the operators working therein, directly affecting their safety and eyesight, but it is a factor of equal importance to the employer, as quality and quantity of output are deciding factors of profit or loss in the operation of the plant.

The introduction to the Wisconsin code reads as follows: "Insufficient and improperly applied illumination is a prolific cause of industrial accidents. In the past few years numerous investigators, studying the cause of accidents, have found that the accident rate in plants with poor lighting is higher than similar plants which are well illuminated. Factories which have installed approved lighting have experienced reductions in their accidents which are very gratifying.

"Of even greater importance, poor lighting impairs vision. Because diminution of eyesight from this cause is gradual, it may take the individual years to become aware of it.

"This makes it all the more important to guard against the insidious effects of dim illumination, of glaring light sources shining in the eyes, of flickering light, of sharp shadows, of glare reflected from polished parts of work. To conserve the eyesight of the working class is a distinct economic gain to the state, but regardless of that, humanitarian considerations demand it.

"Finally, inadequate illumination decreases the production of the industries of the state, and to that extent, the wealth of its people. Factory managers who have installed improved illumination, are unanimous in the conviction that better lighting increases production and decreases spoilage."

The Wisconsin Commission has adopted a rule to the effect that, "diffusive or refractive window glass shall be used for the purpose of improving day light conditions or for the avoidance of eye strain, wherever the location of the work is such that the worker must face large window areas, through which excessively bright light may at times enter the building."

A glass is now available which meets the above requirements. It properly diffuses the light and prevents sun glare passing into the building and is known as Factrolite.

Engineers of to-day are making a thorough study of illumination, so that they may be able to plan and lay out industrial plants, to scientifically increase their efficiency to as near the maximum as possible. This accomplished the engineer is not only doing something worth while for his employer, but is doing quite as much for himself by coming into prominence with modern ideas.

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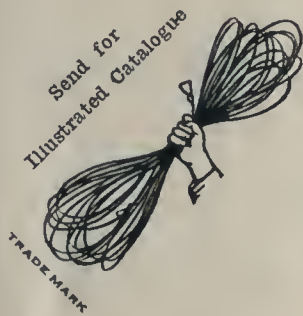
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Cornell Co-op. Society

MORRILL HALL

ITHACA, N. Y.

ROAD CONSTRUCTION IN NATIONAL FORESTS

(Continued from page VIII)

that present themselves in the development and improvement of the so-called market roads. In the forests the engineer is not restricted to a dedicated right of way or to merely widening existing highways; his restrictions have to do mainly with obtaining a suitable maximum gradient and minimum curvature, having of course appropriate consideration for the purposes to be served and for future development. It is here then that the locating engineer will find the opportunity to apply his ability to the utmost, or may I call it, his gift or inspiration. The majority of older highway engineers of today received their preliminary training upon railroad locations, but as the railroads no longer have need for extensive development, does it not of necessity follow that in order to be successful the young engineer must look to the pioneer road work, such as obtains in our forest roads, for preliminary experience before attempting the development of the high type of road in the populous sections of the country?

Much of the field work upon forest projects is extremely hazardous. The field party is frequently compelled to use ropes or other devices for protection of life and limb. Much of the rugged work is along the hill side with slopes of from 30 to 60 degrees with the horizontal if not quite vertical.

An interesting parallel to some of this location is found in the famous Cornwall-West Point road around Storm King Mountain in New York state. This work is now under construction by the New York state highway department and its interesting mountain-side location may be seen plainly from the Hudson River steamboats. The surveyor on the Storm King road had an advantage over the forest road surveyor in that he was always near his base, the country while exceedingly rough was more open than that encountered in the forests and immediately below him was a railroad with a river of sufficient width to assist him in determining his line. The forest survey, however, is compelled frequently to "work blind" guided by his ability to "sense" his line. It is frequently necessary to run several trial lines with the aid of an Abney level.

Forest road surveying involves all the elements of pioneer engineering and is largely in the nature of an exploration, and it may be truly said that the mantle of the early trans-continental railroad engineer has fallen in the present generation upon the shoulders of the forest road locator.

EDITOR'S NOTE:

A very interesting article covering some of the details of construction of the Chippewa Project mentioned in F. P. Williams' article will appear in an early issue of The Cornell Civil Engineer.

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MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

VOL. XXX, No. 5

FEBRUARY, 1922



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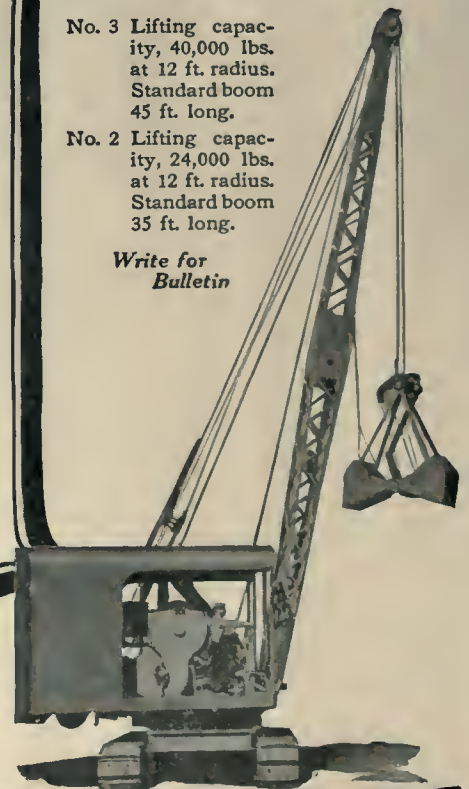
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Eighty thousand workmen with the quarrying tools of antiquity toiled in the subterranean quarries from which King Solomon obtained the pure white stone for his Temple—begun in 983 B. C.

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FEBRUARY, 1922

No. 5

EDITORIALS

THE NEW YORK STATE LICENSE LAW

The New York State License Law is a good law in more ways than one, and as a whole should receive the endorsement of most engineers. This law goes into effect May 5, 1923, and is similar to those passed by most of the states of the union. Tennessee has also recently joined the ranks of the states having laws governing professional engineering and land surveying. Every engineer and architect practising in Tennessee after April 9, 1922, in responsible charge shall be required to obtain a license.

The licensing of engineers is inconvenient but it is a necessary procedure in order to protect life, health and property. Any person practising in the state shall be required to submit evidence that they are qualified to practise, this to be satisfactory to a board of examiners, five in number, appointed by the regents of the State of New York. The requirements are not very strict, but still capable of restricting those who would constitute a menace to the public welfare.

Six or more years of active engagement in professional engineering work, one of which shall have been in responsible charge, shall be sufficient evidence to the board necessary to obtain a license. It is to be noted that each two years of study in a school of standing satisfactory to the regents, shall be considered as equivalent to one year of such active practise. There are certain exemptions to this law, among these being non-residents or those having no established place of business in the state, and whose practise does not exceed 30 days in any calendar year in this state, provided that said person is legally qualified to practise in their state or country. Exemption is also granted state and federal employees for the period of their service for said governments and also to those whose application for a license is pending.

The law is strict as to the penalties of violation, which are very drastic and comprehensive. Any person who practises illegally is liable to be punished by a fine of not less than 100 nor more than 500 dollars, or imprisonment for a period of three months,

or both fine and imprisonment, and if after a hearing three of the five members of the state board vote that a professional engineer is guilty of gross negligence, incompetency, and misconduct in the practise of professional engineering, the board shall recommend to the regents the revocation of the certificate of license. It would be well for those who practise or intend to practise in the State of New York to secure a copy of this law. One of the fine points of this law is that it will require corporations and private individuals to employ licensed engineers to supervise work of an engineering nature and in this manner tend to protect life and property from the practise of inexperienced and unfit.

BROADENING AN ENGINEER'S EDUCATION

Engineering educators have come to the conclusion that an engineering student should have a broader education, and more cultural training than that offered at present. The present course given in most engineering institutions is of a very narrow technical nature. In a recent book J. H. Hammond, who is a successful mining engineer, very strenuously advocates a broader and less technical course for engineers. He says in part that the colleges should turn out fewer illiterate and unread technicians, but more widely educated engineers in the broadest sense of the term. Prof. P. B. McDonald, College of Engineering, Dept. of English, N. Y. U. in a recent article lends his hearty endorsement to Mr. Hammond.

A large measure of the opposition to a broader course has been that the time in a four year course is very limited, and that even now many technical subjects have to be passed up due to lack of time. This question can be settled by having a six year requirement for a degree. Of course this would prevent many students from attending an engineering institution, but as they are already overcrowded, it would be a good thing. A six year course would not eliminate the men who really are going to practise engineering but those who only come to college for a degree, and to whom it does not matter what it is in,

as long as it is obtained in the shortest possible time.

With a six year course, the engineer could have a broader education and as a consequence be better fitted for public service and administration. The question that now arises is what should the prospective engineer be taught in an effective cultural course. The special need at present is a prospective of history and literature, and a foundation for wide reading in latter life. Perhaps a well edited book descriptive of engineering projects of the ancients as compared to those of the present, of a semi-technical nature would partially fill the requirements.

In the freshman course lectures are given by various professors in the different departments of engineering. A course similar to this could be instituted and called a cultural course. It would of course emphasize the changes in civilization, its growth with the growth of science, literature, history, biographies of great scientists, philosophy, art, music and drama. A course of this nature would broaden the student and make him see beyond the borders of his chosen profession.

It is said that one of the reasons why an engineer is seldom fit for public management is his lack of training and education outside of his immediate profession. When such a statement can be made with absolute impunity, it is time that the engineering facilities in the various universities acted. If time is limited, then the engineering course should be extended and thus give the student a chance to broaden his mind. If a six year course cannot be instituted perhaps a five year course would fulfill the requirements.

FINALS

Once again we must face the interrogative statements on mimeographed sheets. As the time approaches, which has been designated by the University to determine the extent of our knowledge of the various courses we have pursued, we sit back and ponder. Have we mastered Hydraulics, or has Bridges proven a stumbling block in our advance to the coveted degree? Too often such is the case, and we frown and fret the more as examinations loom ever nearer.

But are finals the true measure of a student's conception of the course? Quite naturally opinions will differ widely upon this question. To some, it is a fair means of extracting from a student the knowledge he has acquired. To others, the field which is covered seems too broad to permit a satisfactory grade on the final. Let us touch upon the Pros and Cons which might be raised.

Careful preparation daily of recitations gives to the student a fair knowledge of the work covered in each course. It is quite beyond human possibility to remember each and every phase of work temporarily mastered in the preceding four months. But nevertheless, the final examination holds the student to account for everything. It is, in fact, to the

undergraduate, a hit or miss proposition. If he has hopes of passing, he must be lucky enough to be asked concerning divisions of the subject about which he is familiar. Because of the amount of ground covered, a diversity of questions must be asked. Consequently, it seldom occurs that one who has worked faithfully encounters a snarl in the finals.

On the other hand, those in opposition are generally those who have slipped thru the term in slipshod manner. Little wonder that the task confronting them assumes gigantic proportions. Sad but true, five months work cannot be mastered by cramming on the night preceding the examination. To those who now entertain a sensation of helplessness, to meet the attack of Block Week, a resolution and determination to pursue the more certain tactics next term, would find them easier in mind in June.

A CARD INDEX

How many students keep a card index system. Not so very many do keep such a system. Most students think it is a waste of time and foolish. What is the use, is the usual reply, or it is too expensive for the small amount of material that we would index.

That is the whole point of the situation, not enough material. There is plenty of material that we think of no consequence at the time, and it is just those things that we should save and to which we can refer in the future. Many times in the classroom the professor in charge refers to some text not used by the student at that time. The enterprising student will file the reference for future use.

There is no time like the present to begin. The earlier such a system is started the sooner the benefits will be reaped.

IMPORTANT CHANGES OF ADDRESS

From time to time we receive notice that subscribers are not receiving their copies regularly. It seems to be the popular idea that the business staff of the magazine is entirely responsible for all mistakes.

It is the business of the Circulation Department to see that you receive your copy each month. If you will consider the matter for a moment you will realize that in order to deliver your copy we must know when you change your address. This applies to both student and alumni subscribers. Not infrequently the first that we hear of a change of address is that we receive an "indignation letter", six months after you have changed your address.

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UNEMPLOYMENT==ITS CAUSES AND REMEDY

Capital vs. Labor—Organized Labor—Production—Combination and Co-operation

By JOHN J. SULLIVAN, C. E. '88

Consulting Engineer

Organized Labor, regardless of type, doctrine, or class are unanimous in one conclusion, namely: that the blame for any or all wrong can be laid at the door of capital or at least at the door of the capitalist. Let us analyze these terms. What is Capital? "Stored Labor", that cannot be denied. But it is correct to say that labor has created capital. Have you ever seen or heard of a person who could not spend more than they earned? Capital has been created by self-sacrifice, the instinct of self-preservation, and the responsibility of self-support has been the incentive which has made the capitalist out of the Pagan, the Savage and civilized man, when it prompted him to lay something aside for the rainy day. What is the financial standing of the world to-day? Our assessed valuation would indicate that we have accumulated about \$600.00 (six hundred dollars) for each human inhabitant of the earth to-day,—not a very encouraging outlook for those who think they would not have to work if capital was equally distributed. Where is this capital located and what is it doing for the world to-day? A small amount of it is in the form of money, which is used as a medium of exchange, carrying on the business of the world, but the great bulk is in our own homes, factories, stores and supplies of all kinds. Hotels, churches, theaters, streets, waterworks, electric light, gas plant, transportation systems, both by land and sea and hundreds of other creations that are making life more easy and comfortable. What is a Capitalist? According to my idea, any person who has a stitch of clothing, or a morsel of food, not consumed at the present moment; the labor union idea seems to be that the Capitalist is anyone who does not belong to a labor union or is not in sympathy with their teachings. The special object of their attacks are the Managers and Officers of large corporations, who in their own right may be much poorer than those who attack them. These large corporations have made possible the development of luxuries and comforts undreamed of two hundred years ago. Examples of this class are our railways, steamship companies, and water power developments.

Another class who are attacked are the very wealthy in their own right. It does not seem to make much difference how they obtain control of the capital, whether by inheritance or by accumulation in the development of large undertakings;—they are all looked on as the enemy of labor. It would be

contrary to all laws of human nature if all men having control of large amounts of capital did not at some time abuse their trust, but because there have been abuses, is that any reason why we should condemn the entire system? So long as the laws of the land give to each citizen equal rights and equal opportunity are we ready to discard a system that improved the ease and comfort of living a thousand fold and try what? A return to savagery. But what has this to do with unemployment? A great deal. You cannot study the question without some knowledge of the conditions; if you realize that the teaching that it is possible to live without work is false, if you realize that the capital of the world is small, if you realize that the capital is now being employed to the end of bettering the condition of humanity, you must realize that capital, an inanimate thing in itself has nothing to do with unemployment, and you must also realize that the trustees of capital, as we will call them, have nothing to gain by having to feed large armies of unemployed, you will begin to look some place else for the cause of unemployment. You may say that I am taking sides with the profiteer and with the manufacturer, who provokes strikes or causes lockouts in order to restrict production in certain lines in order to maintain prices, or with the jobber and middle-man, who destroys food stuffs when there is a surplus rather than sell them at a lower price and that I am against the Unions. That is not the case. I realize that there are men who may be termed capitalists who have done things that brand them as much the enemies of mankind as big Bill Haywood. As for the unions,—I am not against them, they have done a lot of good in the world and according to my belief, the solution of our greatest troubles is in co-operation and you cannot have co-operation without organization and that implies unions. What I am against is the false teachings of the unions. There are certain doctrines that the public will never tolerate, among these are, restricted production, sympathetic strikes and closed shops. We will deal now with the first,—"Restricted Production," and analyze its effect on unemployment.

Restricted Production

The socialists tell us that we are not suffering from restricted production, but rather from over production, because our warehouses are over crowded with goods and no market. Has it ever occurred to you that there is another cause of this seemingly

over production, namely: under production of the individual, with the result that the cost price of the manufactured article is so great that the ordinary person cannot afford to buy. Another truth that is generally overlooked is the fact that there can be no definite line drawn between consumer and producer. We are all consumers and the great majority of the people of the earth are producers. The result is that anything that increases the cost of productions works to the disadvantage of the entire world. Put ten men on an island with no communication with the outside world. If they work eight or ten hours per day they will live eight to ten times better than if they work only one hour per day at the same rate of production, or on the other hand, if they work a given number of hours per day, but by applying efficient methods and energy, they increase their production three fold, then they can live three times better in one case than in the other. What is true in the case of a few individuals is generally true of the whole world, and I ask what are the conditions in the world at the present time? Under the guise of bettering the conditions of the so called working classes and under the false doctrine that by restricting production you can create more jobs, the leaders of organized labor, I care not whether they be International, National, O. B. U. or I. W. W., have restricted production to such an extent that during the past seven years of ruin and destruction, the cost of production has increased to a point beyond the reach of the consumer. But you say men are working a reasonable number of hours and how can you lower the cost of production without lowering wages and how are the unions restricting production? They are restricting production in several ways, the principal ones being the prohibition of piece work, the restriction of the amount of work a man may do in a given time, and worst of all the restriction of what a man may do.

I will illustrate by some practical examples. You may have heard the story that is going around about the plumber who was fined \$10.00 by his union because he was found sharpening his lead pencil and in this way doing the work of a carpenter, consequently doing some poor carpenter out of a job. This may or may not be true, but if it is true, it will only be a short time when neither the plumber or the carpenter will be permitted to sharpen their pencils, for we will surely have a pencil sharpening union. I will now give you a real practical example. The transition from horse drawn vehicles to motors is about completed. When it started fifteen or twenty years ago, and you wanted to change your stable to a garage, you got a handy man and the change could be made at a cost of \$50.00 to \$100.00 for a small job. Ask a contractor today to figure on the same job and he will quote you a figure at least five times as great. You may protest, but he will tell you that he is powerless. He realizes it is a rough job, but the unions will insist that each item of work must be

done by tradesmen in that line. You will have to have a carpenter to cut a hole for your chimney, a brick layer to lay the bricks, a tinner to put in the flashing, a mason to put in the concrete floor, a plumber to connect a water tap, an electrician to change a switch or move a light, a painter to do the painting, and some of them are not allowed to work without a helper, and there you are. Go to the railroads and ask them how many men they are compelled to employ to do the job that one man performed a few years ago. Wages are a small factor in the extra cost of production in comparison with the other restrictions that I mentioned. I will give you another example that actually occurred in my own experience. I was severely criticized by the Audit Department of a large corporation because the wages a couple of men were making amounted to nine dollars each per day. To prove that I was justified in what I did, we had similar work performed by day labor, which at that time was paid \$1.50 per day, the result was that the unit price of the work was trebled. You can figure it out for yourself. The man working by the piece did the work of eighteen men working on time. This seems absurd, but nevertheless it was an actual fact. Therefore it must be plain to you that if the cost of everything you buy could be lowered to one half or three quarters of what it is now, even those of you who may be fortunate enough to have money sufficient to buy all you require, would buy even more and those less fortunate could double their purchases, and the result would be that there would be a demand for more goods and consequently a demand for more production. Let every man work to a 100% efficiency and we will have sufficient and more than enough for everybody. I have explained that our life's work lies in making a living and not creating capital. You should realize that if every man does not do his share, then we are putting an unfair burden on our neighbor. If we lay aside a little for a rainy day to make it easier for our old age, and if there is anything left, it is capital which can be used to assist in creating luxuries and comforts for those who come after us, by being used to purchase plant and machinery to assist them in more easily making a living by increasing the producing capacity of the individual. One more thought I will leave with you, is this, that the organized union laborer is, in general, not a producer of actual necessities of life, but rather the producer of luxuries and comforts made possible by capital saved up in the past. If you destroy capital you get back to the case of the ten men on the island with nothing to work with but that which they create individually. What will be the result? The organized laborers will die of starvation just as soon as they have consumed the surplus stored food. The farmer can live if there is no general crop failure over large areas. The labor leader will doubtless tell you that if farm laborers were properly organized and their

production restricted according to unionized ideas, that farm produce would not be selling at the low prices now prevailing. That may be true, but what would be the result? Death from famine, and who would be the first to starve? The answer is obvious. I want to say too, that without capital the industrial laborer cannot exist. Christianity claims the credit of abolishing slavery from the world. That was noble work, it rid the world of a condition that no one wishes to see returned. Today we have ordained ministers preaching socialism, which leads to a condition a great deal worse than pagan slavery. The latter system produced capital by which production was increased and the slave driver made the slave produce, the result was that the slave had very little fear of dying from starvation. I have given you examples enough to indicate the results of restricted production and I think the reader will be bright enough to appreciate this true effect of restricted production on unemployment. Now you rightly ask, what is the remedy? I can only give you my ideas in answer and that is co-operation.

Combination and Co-operation

Socialism can only have one conclusion, that is Anarchy, without law and order. We may safely infer that this was the condition on this earth at one time, then master and slave. From that state, the student of history is fairly well acquainted. Modern civilization has in our time changed greatly. When I was a boy, the slogan was competition; that spirit is not entirely dead, but nearly, and in its place we have Combination. The world must thank the labor movement for the development of combination, and, while the world is in general, advancing and conditions are improving, it appears that much more can be accomplished by a further development of the spirit of co-operation. Nothing has advanced the science of medicine more than the work of Medical Societies, where the members have co-operated with each other in developing the science of their profession. The same is true of engineering, railroad-ing and other sciences and businesses. Now if we can make capital fully realize that it can do nothing without labor and if we can make the industrial worker realize that his very existence depends on capital, we will not have much trouble in getting the two forces to co-operate, and when you do that you will have solved the unemployment problem. I will give you a concrete example of the practical method of co-operation that I have in mind. A few months ago, I was in a small town of three or four thousand people, all practically depending on a single large industry, and practically the only large one of its kind not closed down at the present time. I asked the Superintendent how it was that he was able to keep going. His answer was that "we have cut the cost of production by over 25%". When I asked him how that was done, he said "the men are working". When I asked him how it was possible

to get men to work under present conditions, he said they had a committee of twenty-one men who represented all classes of employees and these men were taken into the confidence of the management and in fact were a factor of the management, and when any dispute came up as to what work a man should do or what he should not do, it was referred to this committee and that in over three years not a single claim made by the management has been turned down by the committee of twenty-one. When I asked him how the union permitted this committee to function, he replied "We had a strike in 1917, when there was no cause for one and we beat them so badly that when they were ready to come back to work we let them back only on one condition,—that there was to be no more interference from outside unions or organizations, that, with the exception of some three hundred reds and their leaders, we wanted the men to organize among themselves and appoint a committee of twenty-one to represent them and that we would open up. The result has been that wages have been cut very little, but the men are working and everybody seems contented."

When you learn that two or three times as many industrial workers outside the town as those in the town were depending on the operation of this plant, I leave it to yourselves to decide whether the men did right in disowning allegiance to organizations controlled in Moscow, Washington or Ottawa, or on the other hand, organizing themselves and co-operating with the representatives of the capital that provided the means of their making a living. Their action has prevented eight to ten thousand people asking for charity on account of the bread winners being out of work.

I wish to say a few words about Public Charity,—no one will stand aside and allow the unfortunate, the crippled or the feeble to starve, but when one sees cash doles handed out to able bodied men who have been on strike half the summer, not for more wages, but to decide whether they work 44 hours per week instead of 48, we begin to wonder where this paternalism of Governments will end. All kinds of insurance and allowances guaranteed by the Government can only have one ending, namely,—the production of race of non-producers.

I was brought up on a farm and worked several years on it, working during the summer months from twelve to fifteen hours per day. I know what it is to labor and how much a man can reasonably do. This idea of co-operation is not a new one to me. Only a few days ago, on going through an old carbon letter copy book, I found a letter to my superior officer written twenty-five years ago, stating that the railroad men who came under my observation did not take an interest in their work nor did they give a fair day's work if there were any possible chance of avoiding it. I asked if it were not possible for the Company to set aside stock in the

(Continued on Page IX.)

COLUMN REINFORCEMENT FOR BROOKLYN ELEVATED LINE

A description of two novel methods used in reinforcing the base of hollow elevated columns corroded by rain water

By JOSEPH S. HARRIS, C. E. '13

Junior Engineer, Transit Construction Commission, N. Y. C.

The following is a description of the methods employed in reinforcing the lower parts of about two hundred columns for one of the Brooklyn Elevated Lines. These columns are of circular cross sections, made up of six circular shaped steel plates riveted together vertically, called the Phoenix Column.

The reinforcement was made necessary by the corrosive action, on the columns, of rain water which entered through an opening between the columns and the cast iron wheel guards around the feet of the columns.

The methods used in reinforcing the columns may be divided into two types as shown by Figs. 1 and 2.

In type one, shown on Fig. 1, the reinforcement consisted of riveting a steel plate $\frac{1}{2}$ " by 3" by about

to expose the column base. The plates were then riveted on, the lower ends resting on the column base. Concrete was then poured in the excavation to within 6 inches of the pavement. A circular steel collapsible form was used for this purpose. The cast iron wheel guard was lowered, after this concrete had set, and then filled with cement grout to within 3 inches of the top. The remaining three inches were then filled in with a bituminous mixture going under the trade name of "Healing Cement." This cement is supposed to expand and contract with the changes in temperature, and does not become brittle and crack, thus keeping the water out of the wheel guard.

In the second type of reinforcement, shown on

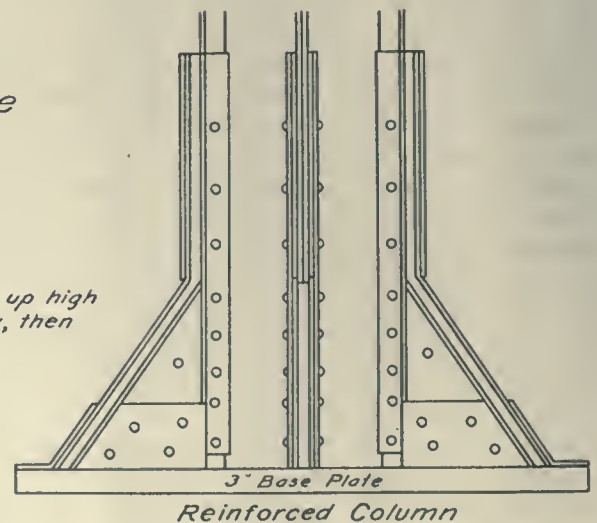
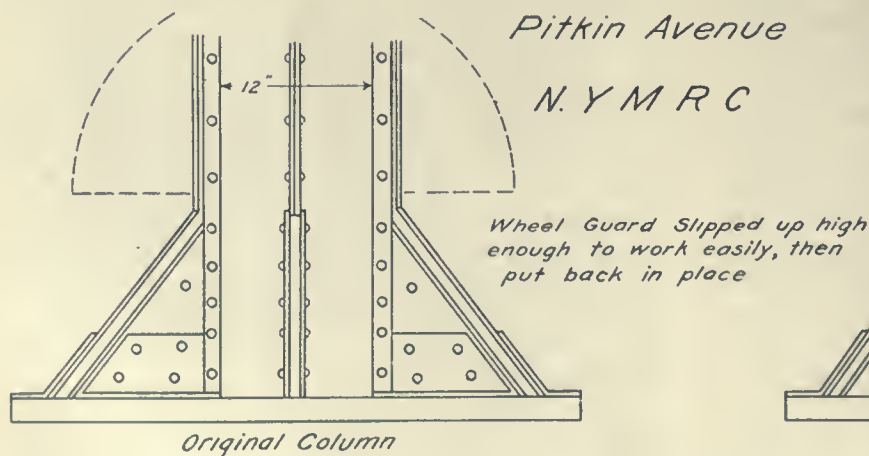


Fig. 1

3'-0" on each side of the six column joints. The cast iron wheel guard was raised up, by sliding it over the column with the aid of hooks and ropes, the ropes passing through a tackle fastened to the cross girders, to a height of about 10 feet. Since in this type the column base was below the street level, the pavement was broken up for two feet on each side of the column and for a depth sufficient

Fig. 2, the columns set into large cast iron bases. The method of reinforcing the columns here was as follows: A tapered steel plate $\frac{1}{2}$ " thick, about 2'-3 $\frac{1}{2}$ " long and tapering from 4" at the bottom to 2" at the top, was riveted on each side of the six column through an opening made in the side by cutting out a section about a foot square at a point 4 feet above the base of the column. These reinforcing rods were

*Pitkin Avenue
N.Y.M.R.C.*

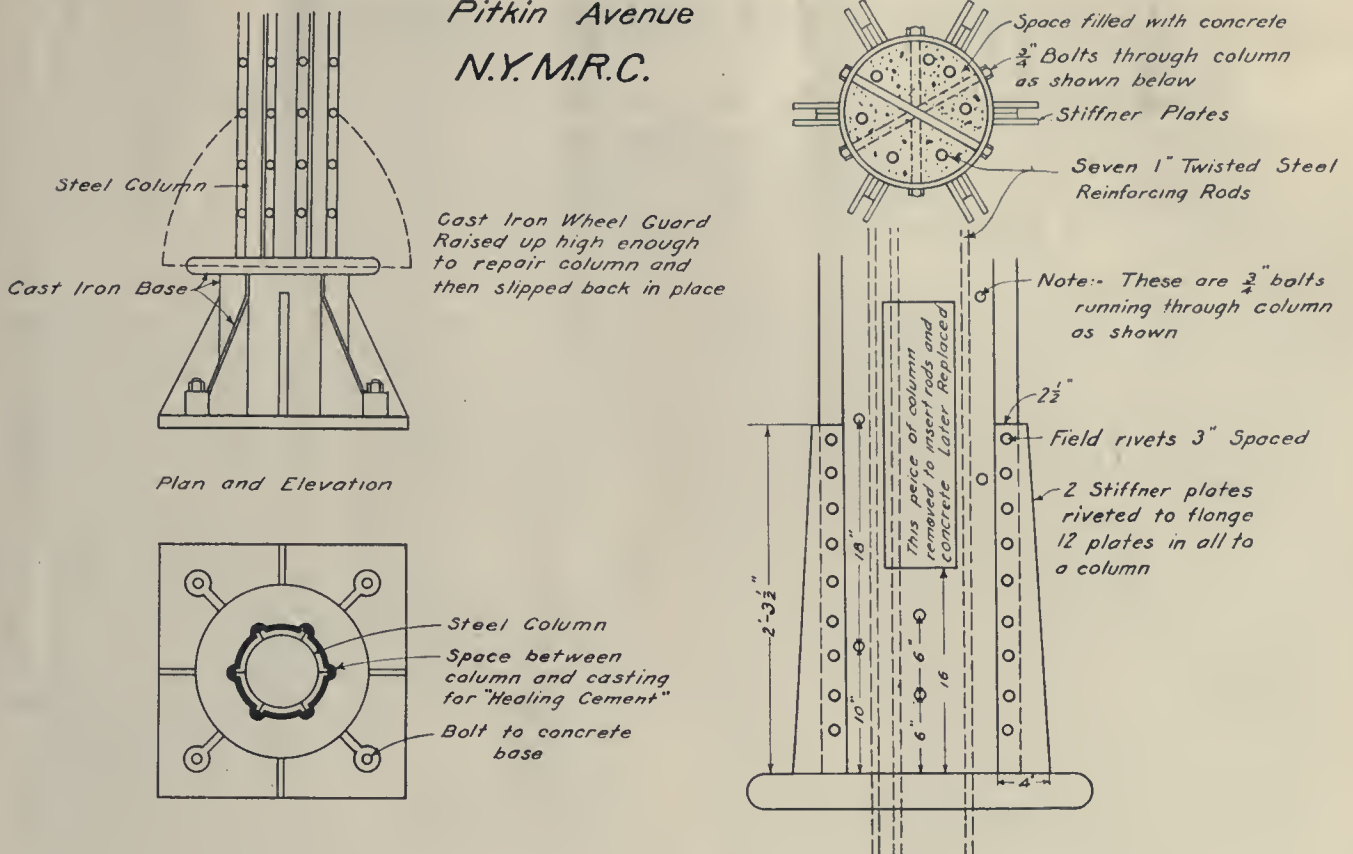


Fig. 2

held in place by wire spacers. Concrete was poured into the columns around these rods and the section of steel plate, which had been cut out, replaced. Grout was then poured in on top of the concrete joints. Seven one inch twisted steel reinforcing rods about six feet long were inserted into the columns through a small hole drilled for that purpose in the column so as to thoroughly cover the reinforcing

rods. In addition, six $\frac{3}{4}$ " bolts were inserted through the column horizontally. The cast iron wheel guard was then replaced and filled with concrete as in type one. Since the reinforcing rods extend from the base of the column to a height of six feet and are incased in solid concrete this makes what is practically a reinforced concrete section six feet high for this type of column.

BOOK REVIEWS

Railway Signaling, by Everett Edgar King, M.C.E., '11, Professor of Railway Civil Engineering, University of Illinois. 6 x 9 inches, 381 + xiii pages, 336 figures and xiii plates. McGraw Hill Book Co., Inc., New York City, 1921.

In reading a new book I usually start with the Preface in order to determine, if possible, the aim or purpose of the author. Even had I not done so in this case, the reading would have indicated to me that Professor King's purpose was "to collect from various sources that which is already in use in common practice in the field of railway signaling and to present it in text-book form suitable for the beginner in his study of the subject," for this ideal is evident from both the selection of topics and from their treatment.

After a preliminary chapter devoted for the most part to organization and rules, the topics treated, approximately as indicated by the chapter headings, are:—Signal Indications; Mechanical, Electro-Pneumatic and Electric Interlocking; Direct Current

Track Circuits; Electric Locking; Manual Block Systems; the Electric Train Staff; Automatic Block Signaling on Double Track with Direct and with Alternating Current; Automatic Block Signaling on Single Track; Signal Mechanisms and Highway Crossing Signals. Rules governing the construction, maintenance and operation of Interlocking Plants are given in Appendix A and Signal Aspects and thirteen plates of the Symbols recommended by the American Railway Signal Association in Appendix B. Appendix C is devoted to a list of terms used in Railway Signaling with their definitions and an excellent index completes the volume.

Thus the student is introduced to each of the systems and the apparatus, sometimes of several different manufacturers, used in connection with it, which he is likely to meet with on American Railroads. And there is little doubt that many a student will ask the reason for the existence of such a variety of systems

(Continued on Page XII)

THE PLANET VENUS

Description of the planet Venus and astronomical method used in observing
and getting data about it

By PROEessor S. L. BOOTHROYD
Head of the Department of Astronomy, Cornell University

Mereury and Venus are the only planets whose orbits lie within the orbit of the Earth. The planet Mercury has the most eccentric orbit of the eight known planets, the eccentricity being 0.206 and the semi major axis of the elliptical orbit, which is the same thing as the planet's mean distance from the sun, is 36.0 millions of miles. Since the sun is at one focus of the elliptical orbit of a planet, the great eccentricity of the orbit of Mercury causes the distance of the planet from the sun to vary from 28.6 million miles when nearest, to 43.4 million miles when farthest. The planet takes almost exactly 45 minutes less than 88 days to make one revolution about the sun.

The next planet outward from the sun is Venus and its orbit has the least eccentricity of any of the eight known planets, being only .0068. Since the mean distance from the sun is 67.2 million miles, this only varies from 66.74 million miles when nearest, to 67.66 million miles when furthest from the sun. Venus takes 7 hours and 10 minutes less than 225 days to complete her journey about the sun.

Our Earth, the third planet in distance from the sun, is also the third in order of eccentricity of orbit, this being only .0168. Since the mean distance of the Earth from the Sun is 92.9 million miles, the actual distance varies from 91.34 million miles (on Jan. 3, for 1922) to 94.46 million miles (on July 2, for 1922).

The Earth takes 365 days 6 hours 9 minutes 9 seconds to complete one revolution about the Sun. The reason why this is about 20 minutes longer than the average length of the year of our calendar is a rather long story and need not be entered into here.

Since the orbits of Mercury and Venus lie within the orbit of the Earth, these planets are never seen very far from the Sun in the sky. When either planet is a sufficient angular distance east of the Sun in the sky so it is above the western horizon when the sky becomes dark enough to see it after sunset, it is called an evening star. Similarly, if west of the Sun in the sky, it is called a morning star. Technically either planet is called evening star if east of the Sun in the sky and morning star if west of the Sun in the sky. Mercury never being very far from the Sun is rarely seen with the unaided eye and so the morning or evening star is usually Venus.

In the case of Mercury with its very eccentric orbit, the greatest angular distance from the Sun at its various apparitions as morning or evening star

varies from 18 to 28 degrees. For Venus with an almost circular orbit, the variation in maximum angular distance from the Sun at its various appearances as morning or evening star is mostly due to the elliptical form of the Earth's orbit, the greatest angle at the Earth between the Sun and Venus being about 47 degrees.

Venus has been morning star since April 22, 1921, and will remain so until Feb. 8, 1922, when she passes superior conjunction with the Sun and will become evening star to remain such until Nov. 25, 1922, when she will be morning star again for the following 292 days. The planet will be very close to the Sun from Feb. 8 to the end of the month, but being very bright will undoubtedly be seen in the evening twilight a few moments after sunset during the last days of the month.

During the spring and summer months, the planet will increase in brilliance, reaching her maximum brightness about Oct. 20, 1922. During September and October she can easily be seen in full daylight if the sky is clear and provided one knows about where to look for her. At her brightest, she casts a clearly perceptible shadow, provided the sky is moonless and there are no artificial lights. With the exception of the Sun and Moon and an occasional comet, Venus at her best is by far the brightest object in the sky. When seen in the early hours of the evening or just before dawn in the morning, she never fails to excite the wonder and admiration of all.

By the ancient Greeks the planet was called Phosphorous when morning star and Hesperous when evening star. In Assyrian mythology Venus was worshipped as the chaste goddess Istar, when she appeared as a morning star, and as the impure Bilit when she was an evening star. These names for the planet persisted long after it was known that the two appearances were different apparitions of one and the same object. The author of the discovery that Phosphorus and Hesperus are really different apparitions of the same body is unknown, but it is reasonably certain that the discovery was made at a time antedating authentic written history. A similar statement applies to Mercury. When it is realized that both Mercury and Venus can easily be seen either as morning or as evening star in the clear sky of the arid and semi-arid regions of southwestern Asia and in Egypt as well as in Greece, it must be admitted that it took a careful series of systematic observations and intellectual ability of a high

order to discover the identity of either object when appearing as morning or as evening star, and to do so for both excites our profound admiration.

If on the first of last May one should have looked at Venus with a telescope magnifying 45 diameters, the planet would have looked like the crescent moon as seen when about a day old. Under the given magnification it would then have appeared almost exactly the same size as does the Moon to the unaided eye. From then to the present, the phase gradually increased till it now looks like a full Moon. After Feb. 8 the phase will gradually diminish till the planet will again look like the crescent Moon early next November. Every 584 days Venus goes through this gradual change of phase as does the Moon in the shorter period of $29\frac{1}{2}$ days. When in 1610 Galileo observed this change of phase for Venus, he obtained the first conclusive evidence for the doctrine that Venus revolves about the Sun, thus destroying the cherished dogma of Aristotle that the Earth is the only center of motion. Galileo's discovery of the satellites of Jupiter and their revolution about Jupiter was also conclusive evidence against the same dogma.

After the observations of Galileo and the inductions of Kepler became known, the doctrine of the heliocentric motions of the Earth and the rest of the planets was accepted by all well informed people. Kepler's inductions, known as Kepler's Laws of Planetary Motion, were based upon the careful and systematic observation of Tycho Brahe, one of the finest examples of scientific measurements. About 1638 the micrometer was invented by Gascoigne and used by him to measure the angular diameter of the planets, which gave a means of determining their actual sizes, giving to Venus a diameter only slightly inferior to that of the Earth. In 1611 Galileo inferred the axial rotation of the Sun from observations on sun spots. In 1636 Fontana saw the markings on the planet Mars from which he suspected the planet to be endued with a rotation on an axis. Hooke, in England and the elder Cassini in Italy were more certain that the planet rotates on an axis and Cassini obtained a rotation period correct within two minutes and a half. Knowing then that the Sun, Earth and Mars all perform revolutions about an axis, it is quite natural that we should expect to find that all heavenly bodies rotate on an axis. This suspicion has been confirmed in every case where the necessary evidence is available. The elder Cassini in 1667 saw a bright spot on Venus from which he suspected a rotation period of about 23 hours. Biachini suspected a long rotation period of $24\frac{1}{3}$ days, but J. Cassini in 1740 practically confirmed his father's period, getting 23h 20m and showed that Biachini's observations were not inconsistent with the same period. In 1789 Schroeter confirmed this result. In 1839 DeVico and his associates obtained practically the same result. All of these results were obtained

from observations on very difficult markings and various observers obtained values of the inclination of the plane of the planet's equator to the plane of its orbit, varying from 53° to 75° . Also it should be observed that none of these observations are inconsistent with a rotation period of 224.7008 days. Such observations and such results do not inspire much confidence and yet it was with a shock of surprise that the world received Schiaparelli's announcement early in 1890 that Venus makes one revolution on her axis during her orbital rotation of 224.7008 days thus keeping one face forever turned sunward, the opposite hemisphere being in perpetual night. The fact that Schiaparelli had previously discovered that Mercury keeps one hemisphere turned forever toward the Sun did not lessen appreciably the surprise, if not dismay, in finding that the Earth's twin sister in size does the same as Mercury. Confirmatory evidence in favor of Schiaparelli's results were obtained by Vogel and Lohse in 1871, by Holden in 1877, by Perrotin in 1890, while Tacchini, Mascari, Cerulli from 1892-1896 obtained corroboratory evidence. The strongest evidence however was obtained by Lowell at Flagstaff in 1896 and in the following decade this result was confirmed by other observers at Flagstaff. With special reference to the investigation of this problem a spectrograph was designed and constructed for the Lowell Observatory and in Dr. V. M. Slipher's hands it has confirmed the results obtained from the study of the markings upon the planet's face.

Ever since the heliocentric motions of the planets, the Earth included, has been generally accepted and it became known that Venus is only slightly inferior to the Earth, it has been a cherished belief that of all the planets, Venus was the most likely to be the abode of life. Cherished beliefs soon became cherished dogmas and dogma always dies hard. Despite the conclusive evidence obtained by Schiaparelli and Lowell, the astronomically interested public and possibly the majority of astronomers as well, refused to accept the fact that one hemisphere of Venus is forever exposed to solar rays of double the intensity of the solar beam on Earth, while the opposite hemisphere suffers the super-Aretic conditions of perpetual night. However, facts are always finally triumphant over dogma, and some recent results obtained at the Mount Wilson Observatory tend to confirm the results obtained at the Lowell Observatory.

At the recent meeting of the American Astronomical Society, Dr. St. John made the statement that the rotation period of Venus could be obtained by the spectroscope provided it was 15 days or less. He said that since his spectrograms disclosed no rotation, it means the rotation period is at least as long as 15 days. Since the only rotation longer than very close to 24 hours that is consistent with

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ALUMNI NOTES

'87. Sidney E. Kelsey is Assistant Commandant and teacher of mathematics at the Wentworth Military Academy, Lexington, Mo.

'89. Professor John F. Hayford of Northwestern University represented the American Society of Civil Engineers on the committee on engineering and on the Council at the seventy-fourth meeting of the American Association for the Advancement of Science, held in Toronto, Canada, December 27-31.

'92. Walter S. Dole is Gas Engineer for the Federal Light and Traction Company, 52 William Street, New York. His home address is 616 4th St., Riverside, Calif.

'93. Hubert K. Bishop, General Inspector at the Bureau of Public Roads, Washington, D. C., represented the American Association of State Highway Officials at the Conference on Construction Contracts held December 15.

Ex '96. Earl Stimson, Chief Engineer of Maintenance of Way, Baltimore and Ohio Railroad, presented a paper on "Should the Increased Cost of Treating Ties be Charged to Maintenance or Capital Account?" at the eighteenth annual convention of the American Wood Preservers' Association to be held in Chicago on January 24, 25, and 26, 1922.

'97. Morris M. Works visited his sister, Mrs. A. B. Kennedy, in Ithaca, for a few days in December. While here, he also renewed old acquaintances with some of the members of our faculty.

'00. George I. Finley is a Civil Engineer at 806 Phipps Power Building, Pittsburgh, Pa.

'01. At the dinner given on December 9 by the Cornell Club of New York in honor of President Livingston Farrand, Ezra B. Whitman was present as a Trustee. Singing and cheering was a special feature, the cheering being led by J. Wright Taussig '08, and John Stearns '06. The committee of arrangements included J. Wright Taussig '08.

'04. Ross M. Reigel is with the West Penn Power Company, West Penn Building, 14 Wood St., Pittsburgh, Pa.

'04. In the Engineering News-Record for December 15, is published an article describing traveling forms for a concrete stadium built in New York City, which were designed by Elwyn E. Seelye. These forms cut the amount of lumber from one-sixth to one-fourth of what would otherwise have been necessary for formwork.

'04. Frank Clinton Wight has been Managing Editor of the Engineering News-Record since March, 1921. He has written articles on concrete, rivers and harbors, docks, etc., in the current New International Encyclopedia, and reviews of Civil Engineering in the American Year Book to which he has been a

regular contributor since 1909. His office is located in the Hill Building on Tenth Avenue at 36th Street, New York City, while his residence is at 32 Waldron Ave., Summit, N. J.

'05. Clinton R. Goodrich is one of two Cornellians included in the cabinet of Mayor F. J. Douglas of Utica. For the past six years Goodrich has been with the Dale Engineering Company of Utica, engaged in the design and construction of reinforced concrete buildings, and the construction of concrete roads. For six months after his graduation, he was an instrument man and inspector on the Stuyvesant Docks, and levee yard improvements for the Illinois Central Railroad at New Orleans, and for the next year and a half he was assistant to the chief engineer of the Hudson River Electric Power Company at Albany, N. Y. Later he was engineer for the Pittsburgh Eastern Company on the New York State Barge Canal Contract No. 8. He also worked a year in the metal mines in Arizona, and on miscellaneous construction work in San Antonio and Galveston, Texas. For six years he was employed by Jas. Stewart and Company, a large construction company, and was in responsible charge of the construction of buildings and structures aggregating above five million dollars in Houston, Fort Worth, and Austin, Tex., St. Louis, Mo., and Ithaca, N. Y.

'06. Arthur H. Kohn was recently married and gives his address as 401 East 17th Street, Brooklyn.

'07. Warren E. Darrow is in the U. S. Engineer's Office, Old Land Office Building, Washington, D. C. At present he is working on the project for a new water supply for Washington.

'07. Louis J. Sieling is an engineering contractor with offices in the Second National Bank Building, Red Bank, N. J. He is also interested in the Monmouth County Lumber and Supply Company with headquarters at the same address.

'08. Harris A. Appel is Sales Manager of the Kolb Building, Inc., at the Fisk Rubber Building, Fifty-seventh Street and Broadway, New York.

'08. Joseph V. Hogan was the Engineer in charge of the \$6,000,000 dry dock in the Philadelphia yards built for the United States. The work was begun in 1917 to provide docking facilities for battleships and for liners that might be serving as transports, and it has now been accepted by the Navy Department. The docking chamber is 1030 feet long, 116 feet wide at the bottom, 143 feet wide at the top, and 53 feet deep, and it can accommodate the largest ship ever built. For a few years after his graduation, Hogan was employed on the construction of the New York State Barge Canal, and became a division engineer with headquarters at Medina. Later he

was associated with the T. A. Gillespie Company, Contractors.

'08. Daniel H. Sanders is Assistant Engineer for the New York Central Railroad in the office of the capital expenditure accountant, New York.

'08. Elliott Vandevanter is Captain in the U. S. Engineer Corps at Ft. Sam Houston, San Antonio, Texas.

'08. Mr. and Mrs. Jirah Hyde have announced the marriage of their daughter Gladys Arlene, to Harry Keith Wilson, October 28, at Hampton, Conn.

'09. Wm. Harley Morris, accompanied by Mrs. Morris, visited Ithaca during the holidays. Neither had been here for about ten years and they found many interesting changes.

'10. William H. Hilborn is now at his home in Phoenix, N. Y. "Hap" visited the School recently accompanied by his small daughter.

'11. Walter F. Heise has changed his address from Wilmington, Del., to 1027 Rambler Avenue, Pittstown, Pa. Since August 1st, 1921, he has been plant engineer with the McClintic-Marshall Construction Company.

'12. Edward H. Taylor is an engineer with Lockwood, Greene & Company, Engineers, 1566 Hanna Building, Cleveland, O.

'13. Harry W. V. Berry is Manager of the Cleveland Offices of the Building Products Company of Toledo, O., at 5005 Euclid Avenue, Cleveland, O. Hyman W. Goldstein, '12, is Chief Engineer of the same company at Summit and Sandusky Streets, Toledo.

'13. Roger S. B. Hartz is with the Claiborne Johnston Company at Baltimore, Md., the Havana office of the concern being closed due to the severe business depression in Cuba.

'13. Harry W. Hillis Captain of the 11th Engineers, U. S. A., at Carazol, Panama, C. Z.

'13. Clinton S. Hunt is Engineer with the Phoenix Utility Company, Frackville, Pa. His permanent address is 387 Aberdeen Street, Rochester, N. Y.

'13. Charles Weiss has an article on "Maintenance Cost Statistics Worth While" in the Railway Maintenance Engineer for December, 1921. Weiss was married on September 27 at Passaic, N. J., to Miss Sara Kohn, daughter of Mrs. Bertha Kohn of Baltimore, Md. Mr. and Mrs. Weiss are at home at Monongahela City, Pa., where he is Supervisor with the Pennsylvania Railroad.

'14. Jose Garrido is Superintendent of Construction and Inspection for the City of Manila, P. I. He lives at 55 Alejandro vi, Manila, P. I.

'14. From June, 1920, to March, 1921, Frank Herrman served as Bridge Engineer for the Oklahoma State Highway Department; during March and April, 1921, he was also Acting State Engineer, and from April, 1921, to the present time he is the Assistant State Engineer. His address is Oklahoma City, Oklahoma.

'14. Thomas T. Newbold was married on November 12, 1921, to Miss Clara L. Shaw of Baltimore,

Md. Newbold is Superintendent of the Raymond Concrete Pile Company. He lives at 202 Macon St., Brooklyn, N. Y.

'14. Lawrence C. Hough is the New England Representative of the Pitometer Company, at 710 Albany Street, Boston, Mass.

'14 Herbert B. Pope is superintendent of Construction for Turner Construction Company at 244 Madison Ave., New York City.

'15. Edward J. Thomas is Engineer with the Development and Construction Company, American Building, Baltimore, Md. His address is Avon Apartments, 6 Read Street, Baltimore, Md.

Ex '16. Mr. and Mrs. Cassius M. Foster of Toledo, O., have announced the engagement of their daughter, Eleanor Mabel Foster (Wells College 1920) to Harold Jay. Jay is with the Aeklin Stamping Company, 1645 Dorr Street, Toledo, O.

'16. Ross G. McClure is in the Engineering Department of the Western Electric Company, at Hawthorne, Ill. He lives at 208 N. California Ave., Chicago, Ill.

'16. Colonel and Mrs. Girard Sturtevant announce the marriage of their daughter, Marjorie Virginia, to Captain Gilbert E. Parker, on December 1, 1921, at Fort Snelling, Mich.

'17. John J. Gromfine is a Lieutenant in the Corps of Civil Engineers, U. S. Navy Yard, Puget Sound, Wash. His address is Kitsap Inn, Bremerton, Wash.

'17. Mr. and Mrs. E. W. Kurz visited her parents in Ithaca during the Christmas vacation.

'17. James H. O'Leary is a transitman for the New York Central R. R. in the office of the Division Engineer, Watertown, N. Y.

'18. Aran H. Dimijian gives his address at 410 West Garden Street, Pensacola, Fla.

M.C.E. '19; Ph.D. '21. Nee Sun Koo gives his address at 408 West 115th Street, New York City.

'20. Albert O. Degling visited Ithaca during the Christmas vacation. "Al" has had a year and a half in Cuba and now hopes to locate a job in the "good old U. S. A."

'20. Floyd W. Hough visited friends at Forest Home and renewed acquaintances on the hill during the holidays.

'20. Vineent B. Lamoureux has been transferred from Columbus, O., to the Water Resources Branch of the United States Geological Survey, Washington, D. C.

'20. Van Brunt Seaman is with the United States Rubber Company at 1790 Broadway, New York City. He lives at 12 Fiske Place, Brooklyn, N. Y.

'20. Paul M. VanCamp is at the North China Language School, Peking, China.

'21. Eiler M. Christensen is with the McClintic-Marshall Company at the Carnegie Plant, Carnegie, Pennsylvania.

'21. Justo Arrastia is Assistant Civil Engineer

(Continued on Page VIII)



SCHOOL NOTES

GOOD ROADS WEEK

The Board of Trustees of the University at a meeting held on Saturday, January 7, appropriated sufficient funds to hold a Good Roads Week at the School of Civil Engineering. The first Good Roads Week at Cornell was held in 1915 and it proved so successful that annual good road weeks were planned. Another Good Roads Week was held in 1916 but on account of the war the plans were altered and no good Roads Week has been held since 1916. Although a committee from the faculty of the Civil Engineering School has been appointed to plan the events of the week and advertise it, as yet no definite date has been set aside for the Week. At this writing we do know however that it will probably be held sometime in March.

At the last gathering of Good Roads Week speakers were obtained from the State Department of Highways and the Federal Bureau of Public Roads to address the 300 or more men that gathered to take part in the program. Further and more complete details of Good Roads Week will be published in our March issue.

ANATOMY

It seems queer to have such a heading in a Civil Engineering magazine, doesn't it? But it's the only proper heading for a story in which "half of everybody" is used.

At the last meeting before vacation of the Board of Editors of this magazine we were discussing the advisability of delivering the January issue to students before we left for our vacations. The question at issue was as follows: If the printer delivered the issue to us on Wednesday evening we could deliver it to the students before seven o'clock that night. But, according to Whitney, if the printer delivered the issue Thursday morning it would be

no use delivering it until after the vacation because on Thursday morning "half of everybody" would be gone before we could get the copies delivered.

WAFLED ON THE SUMMER BREEZE

At the end of summer school last summer, one of our budding Civil Engineers found himself broke. Rather than write for money and ride home (to Connecticut) on the train he thought he'd "bum" his way home by getting rides on automobiles. He had many interesting experiences on his trip which took him through the southern part of New York and the northern part of Pennsylvania across New Jersey to New York City and thence to his home in Connecticut.

He stopped at a Dutch farmhouse in northern Pennsylvania and asked for a drink of water. The drink was given him, and having thanked his host with true Cornell civility, was about to continue his journey when he noticed two dogs standing next to the farmer. The larger one of the two dogs was the younger and the smaller one was the older. The Dutch farmer, in trying to explain this to our C. E. friend said, "The bigger vun is the liddler vun and the liddler vun is the bigger vun." His wife who was standing by saw his mistake, laughed heartily, and said, "He don't vant to say dat. He wants to say dat the older vun is the young vun and the young vun is the old vun." And she was at a loss to account for the farmer's and our friend's uproarious laughter.

PER—HAPS

Professor Weber of the Department of Hydraulics tells this one about one of the professors he had when he was an undergraduate. This particular professor was very meticulous and very exacting as regards any questions which he might put to his class.

An answer to one of his oral questions was never correct from his viewpoint unless the student said exactly what was in the prof's mind as the correct answer to that question. As a result, it was very frequently that the prof would go around the whole class and never get what he considered a correct answer to his question. He would point his finger at one student, listen to the answer, gravely shake his head in the negative and solemnly say, "Next." In this manner he would go around the whole class.

At one time, the prof asked a question to which the correct answer was ten pounds per cubic inch. Most of the students merely gave ten pounds as the answer. The prof, however, gave them a hint and said, "The answer is pounds per..." As was his custom, he went around the whole class saying to each student "pounds per...". The student would say square inch or square foot or cubic foot but no one seemed to hit upon pounds per cubic inch. Finally, a big, husky student who sat in a back seat and played fullback on the football team, became sick of hearing the familiar "pounds per..." drone, raised his hand as if he knew the correct answer. The professor called on him and the big fellow blurted out, "Pounds perhaps and shut up."

ANOTHER ONE

This same professor put the following question to his class one day. He asked, "Suppose you had a transit with an immovable head and you had it set almost over the point, how would you get it exactly over the point?" (We're wondering how many of our readers can answer it the way he wanted it answered.)

Again he went around the whole class questioning each student in turn. One student would say "Move the instrument", another would say, "Shift one leg," and a third would say "Move the legs." But, from the prof's viewpoint, these answers were all wrong. No one in the class succeeded in getting the correct answer which in the professor's mind was, "Step on one leg a little."

A PUN

Much as we are against publishing puns we cannot help but run this one told by Professor Perry. Professor Perry in explaining the kind of goods for which a carrier is responsible said, "Now bear in mind that a carrier is not liable for Perry-shable goods."

ABSENT MINDED?

Jokes about the absent-mindedness of college professors are so common as to be almost offensive. There is one which is rumored about Lincoln Hall which will bear appearing in print.

One cold December morning one of our professors rushed into his eight o'clock class a few minutes late. He was in such a hurry that he did not even stop in his office to remove his overcoat. Consequently, he took off his overcoat in front of the class and stood before the students in his undershirt. With an exclamation of surprise he grabbed his overcoat and

put it on again and muttered to himself, "Now I know why I was so cold coming up the hill this morning."

A DETECTIVE STORY

We were not intending to write the following but we have been driven to it by the self-confessed ignorance of one of the class of '25. This frosh, seeing the account of the winning of the typewriter by R. H. L. Osthoff, '23, posted on the magazine's bulletin board in the main hall, walked over to the board and exclaimed, "Gee, let's see about this typewriter, I didn't even know they were holding a raffle." Of course, we have no right in being riled against anyone for saying the above, but when it is considered that the notice referred to had been posted two weeks or more, our ire has just cause to rise.

It may be interesting for the neophytes to know that the CORNELL CIVIL ENGINEER has held a raffle of trade ads—ads that were taken in our magazine and the space paid for in the form of merchandise. This merchandise was raffled off from December 1 to December 20. The typewriter was won by Osthoff who held the lucky number of 117. The mystery of the number 117 is hereby solved.

TRAMWAY ACCIDENT

The students, upon returning from their Christmas vacation, were all sorry to hear of the serious damage to the rolling stock of the Ithaca Traction Company. Due to the cold snap during the vacation the hills were very icy and one of the cars became uncontrollable and slid backwards down the State Street hill crashing into another car. No serious injuries resulted, but the damage to the company's rolling stock is estimated by those well informed as reaching fifty per cent. The other car is still running. It is interesting to note that the runaway car number 33 crashed into car 41, but what's in a number?

A COMMENT

Someone in reading the last issue of the CORNELL CIVIL ENGINEER noted under the Schools Notes Department at the top of page 59 the heavy black border around a few lines of black face type. You will remember that in this box we were exhorting you to come out for C. E. basketball or at least to give your moral support to the team. Our idea in having it set in black face type and putting a heavy black border around it was to get your attention. But as one wise sophomore expressed it, "Since when have they been publishing obituaries?"

Now, that's just the point. It was an obituary and still is. As far as C. E. Athletics go we might just as well publish all news about it with a black border around it. This is the contention of many of the C. E. students. But despite all this pessimism we still are optimistic. In Professor Conwell we have one of the best Athletic Advisers, and in "Fritz" Schreiner we have an excellent Athletic Director. But these two men can't do it all alone. They need a little support from you.



UNIVERSITY NOTES

FOUR MORE CORNELL VICTORIES

During the Christmas vacation the Varsity basketball squad started the year in a most gratifying manner by defeating its four rivals by safe margins. The Cornell team showed a decided superiority over its opponents in the first three games, but received a surprise in the stiff opposition of the Rochester quintette.

Nine members of the squad accompanied by Coach Ortner, Manager W. S. Gutwillig '22, Assistant Manager T. C. Riley '23 and Trainer Sheehan made the trip. The nine men were, Captain Rippe, Cornish, Downs, Luther, Barklew, Porter, Pope, Crabtree, Capron, and Wedell. All men making the trip played in at least one of the games.

Western Reserve. The first game of the season was played against Western Reserve at Cleveland. During the first half the Ithacans were surprised by a red hot attack, remaining on the small side of the score until the last two minutes of play. Thruout the game the shooting was decidedly poor but the Cornell team slowly increased its lead, making the final score 33 to 22.

Wittenberg. The squad showed a decided improvement in the game against Wittenberg, and the smooth working of the Cornell offensive was too much for the Ohioians. During the first half a bitter struggle kept the score tied, but during the second half Cornell forged ahead leaving the score 23 to 17.

University of Buffalo. An unusually large crowd was present to see the Buffalo organization crumble under the fierce attack of Cornell. A weak defense on the part of the local team, and the smooth passing of the Varsity accounted for the score of 36 to 13.

University of Rochester. The unexpected nearly happened when the Rochester quintet, conceded to be one of the easiest teams scheduled, put up a fierce battle keeping the final result much in doubt. Substitutes sent in during the latter part of the game saved the day for Cornell bringing the score up to 20 against Rochester's 15.

Results of the Trip.

Cornell	33	Western Reserve	22
Cornell	26	Wittenberg	17
Cornell	36	Buffalo	13
Cornell	15	Rochester	15

UNIVERSITY CONVOCATION

On Wednesday, January 11, 1922, Founder's Day, a Convocation Hour was held in Bailey Hall at which Charles E. Cornell, lineal descendant of Ezra Cornell was the principal speaker. Mr. C. E. Cornell gave an interesting address to the crowd of students which packed Bailey Hall. He revealed intimate and personal glances of the founder, told a few amusing anecdotes about his habits and eccentricities and finished his address by reading extracts from some of Ezra Cornell's letters to his son, Alonzo B. Cornell, the speaker's father, and by exalting the ideals which prompted Ezra Cornell to found Cornell University. Mr. C. E. Cornell spoke of his grandfather as a man of steady perseverance, cheerfulness in the face of difficulties and broad minded sympathy.

The program started with a few organ selections by Prof. J. T. Quarles. The convocation was formally opened by President Livingston Farrand who emphasized the significance of Founder's Day and the valuable opportunity of receiving a personal touch with the life of this truly great man. Mr. Cornell then gave the main address of the occasion. Recalling his grandfather as a gentleman of the old school he started with Ezra Cornell's arrival in Ithaca in 1828 and traced through the period of his most interesting life. Ezra Cornell always came to those afflicted with trouble with a cheery smile and helpful words, despite what laborious duties might be at that time weighing heavily on his own heart. He always endeavored by precept and example to impress the young with the necessity of seeking knowledge and the need of pursuing a university education.

Doctor Farrand closed the hour with a few remarks exalting the Founder for the broad policy with which he founded the University.

THE PLANET VENUS

(Continued from Page 71)

all the observations of surface markings which have been obtained since any have been even suspected, is 224.7008 days, we are left with that as the only alternative.

Another result announced by Dr. St. John is indirectly confirmatory, namely that the planet's atmosphere is devoid of oxygen and water vapor. As a matter of fact the investigation regarding the presence of these gases in the atmosphere of Venus was Dr. St. John's objective and the result announced relative to the rotation period was a by product of the main investigation. The question of water vapor will be further investigated by Dr. St. John as he is not quite satisfied yet that it is certainly absent. The further investigation awaits only the development of photographic plates sensitive to certain bands in the spectrum of water vapor which are in the infra red and are a very sensitive test of the presence or absence of even quite minute amounts of water vapor. These results of Dr. St. John's shatter another cherished dogma, namely, that the extreme brilliance of Venus is due to the fact that the face of the planet is completely enveloped in clouds of water whose brilliant upper surface is what gives the planet its brilliant luster. Lowell explained over two decades ago that the brilliance of the planet is just what we should expect from the fact that one hemisphere is eternally exposed to the sun and therefore very hot, and the other very cold. The air near the planet's surface flows from the cold to the warm side while high above the surface the flow is from warm to cold. Any water which might conceivably have originally existed on the warm side would be evaporated and carried to the cold side, there to be precipitated as snow. So the warm side must be devoid of water and subject to desert conditions, in fact desert conditions such as the Earth knows not of. The strong wind blowing near the surface would raise dust which keeps the air always full of fine particles and it is this finely divided material in suspension which causes the Planet's atmosphere to be so good a reflector of light. Under these conditions no life could exist on the planet since there is accumulating evidence that free oxygen in a planet's atmosphere is the result of vegetative processes, we should not expect to find free oxygen in the atmosphere of Venus. The fact that we do not makes it certain that vegetation does not exist on the planet.

Another fact which corroborates these conclusions is that many observers have noticed exceedingly faint gleams or glints of light from the dark side of Venus. As Lowell observes, if the side of the planet on which eternal night reigns be covered with a vast sheet of ice, we have there "a substance able to mirror the stars to a ghostlike gleam which might be discernible even from our distant post."

DAYLIGHT ILLUMINATION.

The angle of refraction being equal to the angle of incident, it is a simple matter to determine the correct angles to use in manufacturing glass which will give good illumination. But for proper industrial plant illumination, there is more to be considered than mere deflection of light. The direct beam of light must be eliminated in order to prevent sun glare, which is objectionable on account of its causing heavy shadows and strong contrasts which decrease the efficiency of employees and necessitate the use of shades which in turn reduce the light to such an extent that daylight illumination any distance from the light source is not sufficient. Therefore, in order to produce a glass which when used in the windows of industrial plants will produce as near to ideal illumination as possible, we must first eliminate the direct rays of the sun by deflecting the light to the ceiling and side walls which re-deflect it back to a distance 25 to 50 feet from the window throughout the entire working area. To accomplish this we have scientifically designed a type of glass which is named "Factrolite."

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ALUMNI NOTES

(Continued from Page 73)

with the Bureau of Public Works, Manila, P. I. He says that Vicente Pascual, '21, and Anastacio de Castro, '21, recently arrived in Manila, and expected to start work with the Bureau sometime in January.

'21. Maurice E. Gillett is a member of the firm of the Snyder Gillett Contracting Company. His home address is 942 Niagara Ave., Niagara Falls, N. Y.

'21. Manuel V. Zabat is Junior Assistant Engineer in the New York State Highway Department, and is at present working on the construction of the Mt. Vernon City Road. He expects to be in the office at Poughkeepsie in the near future. His present address is 65 E. Third Street, Mt. Vernon, N. Y.

In Memoriam**Charles W. Raymond, '76.**

Charles Ward Raymond died in Sacramento, Cal., on October 27, following a stroke of paralysis.

Raymond was 72 years old and had been in failing health for some time. Registering from San Francisco, he received the degrees of C.E. and M.C.E. at Cornell in '76 and '78 respectively, and was an original member of the Adelphi Literary Association. He returned West after his graduation and worked for some of the leading quartz mining companies in California and Colorado, spending several years in Grass Valley.

After 1893 he practiced as Consulting Mining Engineer in and near San Francisco until 1910 when he removed to Sacramento. Here he continued his practice and also dealt in real estate, maintaining an office in the Ochsner Building up to the time of his death.

He leaves a daughter, Miss Elizabeth Raymond of San Francisco and two sisters, Mrs. Fannie Smedberg, and Mrs. Geo. F. Ashton, also of San Francisco.

J. Paul Bright, '17

Joseph Paul Bright died suddenly on October 29 while motoring to Princeton, N. J., to attend the football game. A blood clot was the cause of his death.

"Babe" Bright was born in Wilmington, Del., on May 3, 1896, the son of Mr. and Mrs. Paul Bright. He prepared at the Wilmington High School and entered the College of Civil Engineering in 1913, receiving his degree in 1917. He was a member of Kappa Sigma and Rod and Bob, and in his junior year was a member of the board of the Cornell Civil Engineer.

For three years after leaving college he was connected with the Fore River plant of the Bethlehem Shipbuilding Corporation, and was actively engaged in the construction of a destroyer at the Squantum plant. Early last spring he became engaged in the real estate business in Atlantic City, N. J. He leaves

his widow, who was formerly Miss Mildred Satherwaite, his father, a brother, and a sister.

NEW MAILING ADDRESSES

- '92. Walter S. Dole, 616 4th St., Riverside, Calif.
- '04. Clifford M. King, 11480 Hessler Rd., Cleveland.
- '06. Arthur H. Kohn, 401 E. 17th St. Brooklyn N.Y.
- '07. Gordon B. Canaga, 4754 No. 9th St., Philadelphia, Pa.
- '08. John E. Armstrong, 380 Marlow Ave., Notre Dame de Grasse, Montreal, Can.
- '11. Walter F. Heise, 1027 Rambler Ave., Pitts-town, Pa.
- '12. Matthew M. Bird, 300 N. Clinton Ave., Dallas, Tex.; Hollister Johnson, Black River Regulating District, Watertown, N. Y.; Morris L. Kaufman, 1145 Carroll St., Brooklyn, N. Y.
- '13. Charles D. Farlin, 168 Drake Ave., West New Brighton, Staten I., N. Y.; Clinton S. Hunt, 387 Aberdeen St., Rochester, N. Y.
- '14. Jose Garrido, 55 Alejandro vi, Manila, P. I.
- '16. Gerald E. Brower, 349 Rugby Rd., Brooklyn, N. Y.; Ross G. McClure, 208 N. California Ave., Chicago, Ill.
- '17. Lient. John J. Gromfine, Kitsap Inn, Bremerton, Wash.
- '18. G. H. S. McNair, Essex Falls, N. J.
- '20. Van Brunt Seaman, 12 Fiske Pl., Brooklyn.
- '21. Damon G. Douglas, 58 E. 96th St., N. Y. C.; Maurice E. Gillette, 942 Niagara Ave., Niagara Falls, N. Y.

UNDERGRADUATE COMMITTEES

C. E. men have quite a representation on the membership of the undergraduate committees, whose appointments were announced recently by the Student Council. There are one or more C. E. students on almost every undergraduate committee appointed.

"Fritz" Schreiner, '22, varsity pitcher, is a member of the Convocation Committee. "Slim" Bryant '22, member of the varsity golf team, will represent the C. E. students on the Co-op Advisory Committee. "Ross" Anderson '22, Manager of the Masque is a member of the Senior Ball Committee. On the Senior Banquet Committee we have "Turk" Brayman '22, varsity guard on this year's champion football team, and B. S. Sines '22, a member of last year's baseball squad.

"Huck" Bosworth '23, varsity football squad, and "Duke" MacBean '23, manager of Interscholastic Track, represent the C. E. juniors on the Junior Prom Committee. "Walt" Rollo '23, varsity pitcher, is a member of the Junior Smoker Committee. On the Sophomore Smoker Committee we have E. F. Buckley '24, first-string end on this year's football squad. J. A. Rooney '24 represents his C. E. classmates on the Sophomore Dance Committee.

Besides this "Turk" Brayman and Lovejoy have been awarded "C" in Football and Track respectively.

UNEMPLOYMENT—ITS CAUSE AND REMEDY

(Continued from Page 67)

Company to be either sold cheaply or donated to the men as a bonus for faithful service and in this way try to create a spirit of interest and co-operation.

The Engineer and the Worker.

Success as a construction engineer does not depend altogether on engineering ability, but will depend much more on your ability to control and handle men. You will find the working man, as an individual, reasonable and amiable if he has not been brought up under the influence of false teachings. If the latter is the case, you must make the best of it, but do not lay the blame up against the individual, but rather to the false teaching, and if you are convinced that false propaganda is being taught, do not fear to attack it and do something to spread the truth. It is my belief that the red element would never have obtained the hold they have on the world today, if during the past thirty years, those who realized that a false doctrine was being preached had the moral courage to come out and denounce it, and take steps to teach the truth as a great number are now doing.

IN OUR NEXT ISSUE:— The next issue will contain among other things an article on the new Chippewa Power Canal near Niagara, which has been recently completed.

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NEW TELESCOPE FOR FUERTES OBSERVATORY

The appointment of Professor S. L. Boothroyd as Head of the Department of Astronomy has given a decided impetus to affairs in that department. Handicapped by lack of equipment and a total disarrangement of the department, due to a suspension of courses due to the war, Professor Boothroyd's task has been a difficult one. However, after much agitation Professor Boothroyd has been aided in his attempt to make the Cornell Astronomy Department one of the best in the country.

The twelve-inch telescope which has lain in storage during the past two years, due to lack of sufficient funds to mount it, is at last to be mounted and to be ready for use by the first of June. The contract for this work has been awarded to Warner and Swasey Company of Cleveland, Ohio.

The step forward in the completion of the telescope was taken by the Finance Committee of the Board of Trustees when it recently authorized the construction of a suitable mounting.

The telescope is to be named after Prof. Emeritus I. P. Church, who was instrumental in raising sufficient funds for the mounting of the telescope.

The twelve-inch objective of the telescope was made by the late John Brashear, one of the most famous lens makers up to his death, about a year and a half ago.

Students wishing to register for astronomy should report to Prof. Boothroyd on Registration Day.

C. E. ASSOCIATION MEETING

The regular monthly meeting of the Civil Engineering Association was held on January 18th at 8 o'clock in one of the Sibley Lecture rooms. Regular business was dispensed with and the meeting was addressed by Colonel H. C. Boyden who is a member of the engineering staff of the Portland Cement Association and himself a prominent concrete engineer, having at various times had charge of the placing of between four and five million cubic yards of concrete in various parts of the United States. Col Boyden illustrated the latter part of his lecture with slides showing graphically the facts brought out in his lecture and showing pictorially the results of different mixes. The main topics of his lecture were the proper curing of concrete after placing, and the proper mixing with water before placing. Mr. Boyden discussed the results of tests carried on by Duff Abrams and his staff at the Lewis Institute, and showed how these results could be applied to practical work with great advantage both to contractor and to designer and owner.

About seventy-five members of the Association were present at the meeting. It was unfortunate that a lecture on so important a subject had to be given so close to Block Week as otherwise it would have been far better attended.

BOOK REVIEW

(Continued from Page 69)

and variety of apparatus, often to accomplish practically identical results. This leads me to express the view that practicing signal engineers, too often acquainted with the practice of their own roads only, would also derive benefit from this exposition of the whole field of railway signaling. Used in this way the book should assist in the movement toward standardization.

The treatment of the various topics is balanced from the standpoint of the ideal mentioned above, being such as to give as good a working knowledge in each case as may be obtained from a book. To this end the illustrations are excellent and the descriptions of apparatus and comments of the author clear and concise.

Personally, I should have devoted more than the brief paragraph in the preliminary or introductory chapter to the history of railway signaling, though I well know that some consider such matter as padding. But I believe that a reasonable amount of such material lends interest to the study and tends toward breadth of view. However, the author is to be congratulated on the successful accomplishment of his ideal, thus having produced the best book for beginners in the study of railway signaling that is now available, and one which, as already noted, should have a beneficial effect upon railway signaling practice.

F. A. B.

Practical Least Squares:—By Ora Miner Leland, B.S., C.E., Dean of the College of Engineering and Architecture and the School of Chemistry, University of Minnesota; Member of the American Society of Engineers, Etc. New York and London: McGraw Hill Book Co. Cloth; 6 x 9 in.; pp. 237; illustrated. \$3.00.

As the author states in the preface, this book is based upon a set of mimeographed notes prepared and used by him in a brief course covering the subject of Least Squares and Adjustment of Observations while he was teaching at Cornell. Although the book is intended primarily as a textbook, it should be of use to engineers and scientists for reference, even to those who are not particularly interested in geodetic work.

In accordance with the practical presentation of the subject of Least Squares which the author had in mind, methods of application and examples are given main consideration in the body of the text, and the treatment of the principles of probability and the analytical derivation of the Law of Error are relegated to appendices. The consideration of the precision of observations is also given a secondary position in accordance with the author's belief that in many cases where adjustments are made the precision of the results does not need to be taken into account.

In an introductory chapter the nature, classification and occurrence of error are discussed in considerable detail and the general method of Least Squares and the classification of the problems treated by it are also considered. In following chapters the treatment of these problems is taken up in turn with several numerical examples in illustration. A whole chapter is given to the solution of normal equations, describing in detail the method of Gauss as extended and improved by Mr. M. H. Doolittle while he was a computer with the Coast and Geodetic Survey.

The longest chapter in the book is devoted to the adjustment of triangulation with a detailed treatment of the adjustment of the quadrilateral. There are given not only the usual methods of adjusting the quadrilateral, but also cases of adjustment to conform to work previously adjusted or fixed. Excellently arranged examples make this chapter particularly valuable for reference.

The engineer in connection with experimental work is sometimes interested in the problem of expressing results by aid of empirical formulas. The author considers the applicability of the Method of Least Squares for this purpose. In an appendix are given some typical curves for facilitating the choice of form of equation to express results.

Aside from the topics already mentioned as included within them the appendices contain a brief history of the development of the Method of Least Squares, a comprehensive and valuable bibliography of the subject, and, particularly for the benefit of teachers, an outline of a short course of instruction suitable for use in a one-hour course like the one given by the author at Cornell.

The book is well adapted to its purpose as a working text. It is clearly written, concisely but yet not with such brevity as to necessitate reading between the lines, a feature which makes a book especially hard reading for a beginner. Not the least valuable parts are the discussions as to the circumstances under which the methods outlined may be used, the limits within which the theory may be expected to apply, and the reliability of the results. The author's extensive experience as a teacher and with the Coast and Geodetic Survey have enabled him to judge very well what it is essential to present in such a book, which while covering its field thoroughly does not contain unnecessary material.

P. H. U.

FORWARD MARCH.

The other day Professor Crandall (the alumni know him as "Carl") imparted this bit of information to one of his railroad classes: "Now, I want you to check and re-check this curve and be sure you've got it computed correctly before you shoulder a gun and march forth into the field." Shades of ye military department!

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MARCH, 1922



One of the giant steam-shovels used in the construction of the Chippawa Hydro-Electric Power Canal. Two other shovels of the same size are shown in the background working on different levels. An account of the construction of this canal appears in this issue. See page 19.



The First Known Use of Coal

Coal is known to have been used by the Romans who occupied Britain during the time of Hadrian, about 122 A. D.

But it was dug from outcrops with the infinite labor of picks, hacked loose piece by piece.

The outcrops were not many and the mining was difficult. Besides the sentinels who huddled over the braziers in the bleak weather, there were but a privileged few who were warmed by coal fires.

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MARCH, 1922

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EDITORIALS

SUMMER EMPLOYMENT FOR STUDENT ENGINEERS

We were very much surprised to learn that there are some civil engineers in active practice who think that summer work on construction jobs does not benefit an engineering student, except financially. They hold the opinion that a few students do get a great deal out of vacation employment in their chosen field but that the great majority of students do not gain as much engineering experience as is often supposed. This thought comes as a revelation to us because we have always been of the opinion that summer employment

on construction work held advantages distinct from any other method of acquiring technical training. "That is just the point," our adversaries argue, "we grant you that summer employment is a rich mine of experience for an engineering student. There are certain things which a student engineer cannot learn unless he attacks them from the practical viewpoint. But we maintain that the average student does not avail himself of the opportunity presented." One of our correspondents has given us supporting evidence for this opinion. He says in part:

"Ask any student engineer on the job, as I have done, at the end of the summer's work whether he has gotten much out of his three months of practical training. Immediately he will answer, 'Yes'. Ask this same man a set of specific questions picked at random about the job and you will be surprised to see how woefully he falls down in answering them correctly. Last summer I was working on the State Highways and at the end of the summer I asked one of our student engineers from Cornell several specific

WHAT BENEFIT DOES AN ENGINEERING STUDENT DERIVE FROM VACATION WORK?

What do you think?

Some engineers believe that students do not derive much practical experience from vacation jobs on construction work. What has been your experience? Did you work during one or more of your summer vacations? If so, do you think you benefited by it?

In an early issue we will conduct a forum on this question for our student and alumni readers. Write us your opinion and let YOUR voice be heard.

questions such as follow: What mixer is used on the job? What is its capacity? What is its water consumption per day? Size of the pipe line and the pressure of the water? What is the source of our water supply? What brand of cement do we use? How many men do we employ? What is the nature of the soil? How many feet are laid per day? What kind of tamping machine do we use? What is the mix for the concrete? Etc. Etc. These questions are elementary and when read over seem too easy. Yet, if the student's answers had been in written form and I were to grade the paper on the basis of 100 I doubt whether the mark would have been any higher than 30. The peculiar thing about it was that he

was only guessing at the majority of the answers. I was truly surprised to see how little this particular student had observed the most common things on the job. The editorial on 'Education by Observation' which appeared in your November, 1921, issue states the case admirably. It is possible to obtain a very good training by merely observing and remembering. But it seems that at the present day the powers of keen observation are practiced only by detectives. The human make-up seems to include only stunted observational powers. However, the faculty of keen observation is of such importance that Dr. Alexander Graham Bell cited it as one of the three interwoven elements of success when he said 'Observe, Remember, Compare!' But it has been my sad experience that college students are very deficient in this matter of keen observation when on summer construction work. For all the practical experience which a student gets out of vacation employment on a construction job, he might just as well spend his summer on a vacation on the sands of Atlantic City."

The foregoing states the case for the opposition. Now let us consider some of the arguments in support of summer employment for engineering stu-

dents. In the first place, it is a very healthy employment. This is entirely overlooked by many and, to some, is a minor consideration. But it is important and should not be passed over lightly. The engineering courses in most schools are very difficult in comparison with the other courses. As a general rule an engineering student has to carry more hours per term and has to work harder than his classmate in arts or law. Eight or nine months of constant application is enough to reduce the vitality of any student. The change offered by outdoor summer employment does a student much more good than is generally realized. It is true that a student has athletics and social activities with which to divert his mind during the college year. But, in the background there always looms the students' nightmare—studies. This worry saps the vitality.

In the second place a student who works with a construction company during the summer often makes a permanent connection with that firm. It is the policy of some large contracting companies to employ the same students each succeeding vacation so that they become trained in the company's methods. When these firms are ready to employ graduate engineers fresh from college they can secure men already trained who fit into their organizations without a jar. If this does not happen to be the case, the student engineer makes connections with several practicing engineers in his line of employment to whom he can always refer for jobs or information about jobs. Good connections in the modern business world are well nigh indispensable to the successful man. The same is true in the engineering profession. The sooner an engineer starts to acquire good connections among his fellow engineers the more valuable do these connections become with the increasing years. The student who works during the summer always stands a better chance of securing a job because he has something tangible to write down on his application under the heads of "experience" and "references".

In the third place, a student who gets out and works during the summer acquires a new perspective of his technical training. After coming in contact with actual construction work he begins to realize what parts of his courses are most important. When he returns to school in the fall he selects his courses with good reasons. While he is pursuing his studies he has a better idea of what parts of the course to emphasize. He knows what he wants and he knows the methods he must use to get it. The advantages which a student derives from vacation employment are not usually recognized because they cannot be reduced to pecuniary standards. The fact that these advantages cannot be measured by mere dollars makes them all the more valuable.

THE ENGINEER AND HIS HANDWRITING

The engineer seems to have a poorer handwriting than men in other professions. We base our con-

clusions on the number of neatly typewritten letters we receive in this office which are rendered of no use as communications by unreadable signatures scrawled at the bottom. It is very unfortunate for us that our correspondence is not wholly with that class of engineers who occupy high executive positions and whose names appear in the letter head. In a good many instances we would not be able to make out even the first initial of a man's name but for the dictator's and typist's initials which usually appear in the lower left hand corner of the sheet. To us, the obvious solution is to typewrite one's name at the end of the letter and then countersign by writing the signature above the typed name. However, this custom has not come into general usage. Some men are too modest to use it. Others think an unintelligible scrawl looks more business-like and is one of the fine points which stamp the successful man. There are a small minority of men who believe that the quality of one's handwriting is important and that often it is the item which determines whether or not a man can enter upon the highway leading to success. Let us cite one pertinent example.

Edward W. Bok, for thirty years Editor of the Ladies' Home Journal, states in one of the early chapters of his "Americanization of Edward W. Bok" that his ability to write a bold, legible handwriting gave him his start and proved of inestimable help throughout his life.

But what has all this to do with engineering? Just this. An engineer's chance of success in life can be improved provided he is a possessor of a good handwriting. And no one knows better than the engineer just how poor his chances for success are. Every detail which might help him in his battle of the "Ascent of the Ladder" should be given very careful attention.

For the first few years out of college an engineer shifts around more than a young lawyer or doctor. A young engineer finds he is always writing letters of application for jobs. What chance does he stand of being considered a desirable applicant if he writes a poor hand, uses bad grammar and frequently misspells? In his book "Engineering as a Vocation," Mr. Earnest McCullough, a Consulting Engineer in Chicago, lays much emphasis on the benefits which good handwriting can bring to an engineer. He states how poor his own handwriting was upon graduation from college and he also explains the steps he took to improve it. He bought several copy books and for months practiced filling them with penmanship. He found that simultaneously with his improvement in handwriting, there appeared an improvement in spelling and grammar. Finally, after much conscientious effort, the desired result was achieved and he has benefited greatly ever since just from his ability to write a clear, bold hand. This is an example for student engineers to emulate.

THE CHIPPAWA-QUEENSTOWN POWER CANAL

By L. H. BURPEE,
McGill University

An article concerning one of the largest Hydro-electric Power Projects in the world,
which was completed last December

FEW ENGINEERS REALIZE the size and great expense of the latest Ontario Hydro-Electric-Power Project. It is at present one of the largest engineering projects under way in the world. Some of the details, and methods of construction used in the building of the canal may therefore prove interesting.

Location and Course of the Canal.

Just above the falls the Niagara River is flowing west and below the falls it turns to a little east of north. The Welland River formerly flowed into the Niagara at a point about two miles above the upper rapids. It is a made-to-order intake which takes advantage of the drop of water in the upper rapids and also flows in a convenient direction. The canal proper flows in a comparatively straight line running about northeast to Queenstown. The lower rapids extend from the falls to within a mile of Queenstown, and it is at the end of these rapids that the power house is situated. The drop in the upper rapids is fifty feet, that at the falls is one hundred sixty-two feet, and that in the lower rapids is fifty feet, giving an effective height of water at the power house, after allowing for the necessary gradient in the canal, of slightly over three hundred feet.

The following is a brief description of the building of the canal taking up the points which seem to be of interest in their approximate order of construction. The canal may be divided into seven sections, the total length being thirteen miles.

Description

The intake consists of six large concrete pipes which are placed at a depth of about thirty feet below the normal water surface and which stick out into the Niagara River. It is their duty to guide water into the canal and prevent ice, which might cause serious trouble, from entering. A concrete wall serves to deflect more water into the canal. In order to build this wall it was necessary to first construct a huge cofferdam, large enough to enclose the entire wall. The water was pumped out and then the mud was removed. This in itself was quite a sizable piece of work.

Three and a half miles of the Welland River then had to be dredged making it deeper and wider. Most of this was done by means of a cableway, the dirt being wasted along the north shore of the river.

The canal chainage begins at the turn from the Welland River. From Station 0+00 to 54+00 the

excavation was done by a suction dredge until the proper depth was reached or until rock was encountered. This depth averaged about twenty-five feet. From this station for a distance of three hundred feet the ground was left untouched, so that it acted as a core, separating the water cut from the dry cut. At station 65+50 the rock section of the canal begins, continuing with but a single break for eight miles down to the forebay. A view of the rock cut is shown below, showing the large drills at work, with a "liner" in the background.



Fig. 1

View of rock cut showing large drills in foreground

The depth of cut, of course varies considerably but the walls are lined with concrete only as far up as the water level. For example, at station 65+50 the rock cut was only twenty feet in depth while at a point two miles further on, a cut of eighty-five feet was required. In the first case it was necessary to build up the bank ten feet.

Before the dry cut could be connected to the water cut it was necessary to widen the cross-section and make it more shallow. This transition occurs between stations 60+00 and 65+50, the cross-section at 60+00 being similar to that at 54+00. When the

core was removed the sections were similar from 0+00 to 60+00. At station 65+50 there is a thirty foot perpendicular wall and then a 1 to 1 slope of riprap up to the earth level, while at station 60+00 there is a $1\frac{1}{2}$ to 1 slope of riprap from the floor up to the earth level. The grading of this slope was done entirely by hand labor and was quite a sizable piece of construction. After being graded the riprap was gunited.

Cut

At one point, as mentioned above, there is a rock cut of eighty-five feet. Above this there was an earth cut of forty feet. The earth was dug out leaving a 1 to 1 slope and a base wide enough to allow for construction tracks on either side of the canal. The slopes were then riprapped and are to be finished with gunite. After the earth was removed channelers worked along either side to begin the rock cut, cutting to a depth of ten feet. The rock was then blasted and dug out leaving the sides clean and uncracked as the result of the blasting. For the next cut channelers were not used but drills worked close to the walls and also in the middle, in the main blasting holes. When the shovel makes the last cut which takes the floor down to grade it is followed by a sealer, derrick, and lining plant. The sealer consists merely of a frame with an elevating platform at each side. As the sealer moves along, the platform is moved up and down so the workmen can remove loose rocks and drill holes to blast away pieces that protrude too far. The loose rock at the bottom is piled into buckets by a gang of laborers and is then lifted up into the cars above by the derrick. The lining plant consists of a mixer with one form in front of it and one behind. The form consists of a wooden frame with a steel face at each side. These faces can be moved in or out by screw jacks and up or down by winches. The floor of the canal is poured in the ordinary manner. In pouring the sides the steel faces are opened out to the proper distance and the ends are closed by boards which are bolted to the frame. The walls are, roughly, one foot thick and are not reinforced other than by the projecting pieces of rock. The gradient of the floor is $\frac{9}{1000}$ of a foot in 100 feet.

It has been mentioned above that there is a one break in the rock section of the canal. This break comes at a point where the line of the canal crosses a deep gully which is a continuation of the bay causing the whirlpool in the Niagara River and is therefore called the whirlpool section. The gully was filled in but the foundation was not solid enough for perpendicular walls, so the cross-section of the canal was made more of a V shape, the floor being ten feet in width with sides sloping $1\frac{1}{2}$ to 1. This arrangement gives the same cross-sectional area as that used in the rock cut. The slopes were riprapped and then covered with steel wire netting stretched across to reinforce the concrete. After the floor was

completed, strips of concrete two feet in width were laid up the slope at intervals of eighteen feet. A steel plate was then laid across two of these strips and weighted down with sandbags. As the concrete was poured the plate was hauled up the slope exposing the concrete below which had completed its initial set and which needed the form no longer. The construction of this section is shown in Fig. 2,



Fig. 2

Note V-shaped whirlpool section

the finished section appearing in the background.

Curves

There are several curves in the canal. These could not be poured by the regular lining plants so special forms were built at the curves, so that the walls would be smooth curves.

Around the curve, holes were drilled in the rock at a downward angle and were placed at intervals of ten feet horizontally and five feet vertically. Bolts were concreted into these holes and the form posts were then secured by bolts and sleeve joints. The forms were in five by ten foot sections and were laid along the bottom, bolted together and then poured. Another layer of forms was then laid and bolted to those below, etc. The concrete was brought in cars after being mixed and was poured into the forms by means of the distributing pipes. The sleeve joints were found very advantageous for they made the removal of forms quite easy without leaving the numerous projecting bars which would have resulted from using one-piece anchor bolts.

The sides of the curves are of equal radii and since the width is the same at the P. C. and at the P. T. as the rest of the canal, the width at the center of the curve will be greater. This greater cross-section compensates for the reduction in the rate of flow on the curve.

The forebay is a large widening of the canal which acts as a reservoir and keeps the flow of water through the power house steady in spite of small variations in the flow through the canal. The capacity of the forebay is nearly as great as all the rest of the canal.

When the canal was completed, except for the core, water was let into it through a five by eight

(Continued on Page X)

ROAD BUILDING IN PANAMA

By J. W. BEARDSLEY '91

A description of road building conditions on the Isthmus and outline of the plan of financing and constructing of new roads, including a discussion of the cost plus percentage type of contract finally adopted

THE REPUBLIC OF PANAMA, an elongated S shaped strip of the Isthmus, is divided by the Canal Zone into two nearly equal parts. The area is about 32,000 square miles and the population numbers a little more than 400,000, exclusive of the semi-civilized Indians, a considerable number of whom inhabit the almost unknown area of the axial mountain range extending thruout the entire length of the Republic. The people have many excellent traits of courtesy, hospitality and pride in their local towns. They are almost entirely lacking in handiwork, such as weaving or the use of tools for working in wood or metal. Their average strength and endurance are very low, due mainly to the general use of an inferior and unbalanced ration and to the prevalence of hookworm and malaria. Other typical tropical diseases, however, are rare.

The wealth of the country is based mainly on agriculture which is carried on today, with few exceptions, by the crude methods in common use for many years. There are extensive forests of valuable timber, but the mineral resources are undeveloped and are probably limited. The currency is based on a gold standard, the "Balboa" equaling the dollar, U. S. currency. The "Peso" with its Spanish subdivisions is in common use for marking prices and its value is one-half the U. S. dollar.

Existing Conditions

Considerable money has been spent for the construction of short roads of a common type connecting a town with its port, but their maintenance has been seriously neglected. No expenditures have been made for the construction of main highways connecting the principal towns and the productive areas of the provinces. In general existing roads and trails are impassable during the rainy season. In the lowlands a crude two wheeled cart is the principal vehicle. Travelers ride the small native pony which is also used as a pack horse in the mountains and foot-hills. The "caynea" or dug-out, unimproved from the earliest days, is important for handling goods on the numerous streams and serving a considerable area. Its continued use is suggestive of the lack of progress and the primitive customs of the people of the interior.

A rather peculiar condition exists relative to the distribution of produce. Each small town has its undeveloped port which can be entered only at high tide and at which boats call weekly or at longer

intervals. No cooperation exists between adjacent communities. The terminal port for all coast-wise boats on the Pacific side where tides vary from 15 to 20 feet is Panama. Coffee, a high-land crop, may be delivered to the port of its district, carried to Panama and trans-shipped to an adjacent port for consumption in a town within a few miles of the plantation where the coffee was grown. This illustrates a typical method of marketing in the provinces on account of the lack of connecting roads.

Today the traffic in the interior is insufficient to merit any heavy expenditures and no demand exists for improved highways on the part of either local interests or political leaders. A progressive highway policy is therefore based mainly upon the benefits to be derived by opening up the provinces for inspection pertaining to the development of the agricultural, timber and mineral resources.

Finances

The revenues of the Republic of Panama are derived mainly from customs which levy an import tax of 10% or 15%, depending upon the class, on general merchandise which totals about 29% of all revenues. The import tax on tobaccos and liquors is approximately 4% and 5% respectively of the total. Other duties make the imports collected by customs about 40% of the total revenues. The revenues derived from the production and sale of beer and liquors are about 20% of the total. The sale of revenue stamps furnishes 6% and the national lottery 4½% of the total. The Republic also receives interest on \$6,000,000, a part of the payment made by the United States for rights to occupy the Canal Zone and an annuity of \$250,000 also paid by the States for a similar purpose. These payments are about 10% of the total revenues which aggregated some \$12,000,000 for the two fiscal years, July 1, 1919, to June 30, 1921.

Expenditures, mainly for salaries, were incurred during these two fiscal years approximately as follows: Government and Justice, 36%; Foreign Relations, 3%; Treasury, 20%; Public Instruction, 15%; Public Works, 25%. Fortunately for Panama no expense is necessary for an army or navy and no danger exists of serious disturbances or civil war, as the United States is bound to preserve order.

Prior to 1919 the revenues had been insufficient to pay salaries and the financial situation was serious. An American Fiscal Agent was employed who first instituted an impartial levy and collection of author-

ized taxes and a fair accounting of expenditures. The immediate result was a surplus in the Treasury, 75% of which was set aside as a road fund in accordance with the provisions of a law recommended by the Fiscal Agent and passed by the legislature.

Central Highway Commission

Early in 1920 a law was also enacted creating a Central Highway Commission of Five Members, of which the Secretary of Public Works was made, ex officio, the Chairman and the Fiscal Agent a member. One of the other members was required to be an engineer and was designated as the Chief Engineer and Executive Officer of the Commission. The engineer and the other two members are appointed by the President of the Republic who also appoints all other employees except laborers. Although the Commission was vested with full authority, by law, over all matters pertaining to roads and bridges, this appointing power vested in the President tended in a large measure to relieve the members of any personal responsibility, and to make the work of the Commission political and expensive rather than technical and economical.

The organization of the commission was completed during the summer of 1920. Its first work was to outline a system of public roads and to select those to be first constructed and then to prepare specifications on which to base construction contracts. As practically no Panamanian engineers and contractors were available who were experienced in road work, it was decided to include surveys, designs and construction in the first contracts on the basis of a "cost plus percentage" contract and to make the amount involved sufficiently large to be attractive to responsible and experienced firms.

Funds

The government had collected nearly \$3,000,000 in its road fund by the latter part of 1920 and it was estimated that the annual increment would be approximately \$1,250,000. No engineering data were available regarding floods and stream discharges, the location of materials suitable for roads, the topography of areas to be traversed, etc. While some investigations were started, the prevailing opinion was strongly opposed to any expenditures for technical studies and to any delays in starting actual construction. Fortunately an excellent laboratory was available on the Canal Zone for testing road materials including bituminous mixtures, mechanical analyses of aggregates, etc., as were also extensive machine shops.

While the economy of one contract was fully appreciated it was considered advantageous for political reasons to prepare two contracts and \$3,500,000 was decided upon as the amount to be expended under each contract during a period of about four years. As several Panamanian engineers and contractors would, probably, be then more or less experienced in road work, it was expected that future contracts would be based on surveys, designs and

estimates of quantities made administratively and that bids would be called for on the basis of unit prices on the construction items involved.

Specifications

A discussion of a few of the special points in the specifications will be of interest and value.

A large guaranty of \$100,000 in cash or certified check was required of each bidder in order to exclude irresponsible bidders. This guaranty of the successful bidder was converted into a small performance bond which might be based on approved mortgages.

The contractor's expenses to be covered by the **percentage** bid were defined in detail. The principal items were all promotion, legal and banking expenses, all administrative expenses outside of the Republic and all expenses of associates who might occasionally visit the works. It included damages and losses of equipment due to neglect on the part of the contractor and the loss of equipment in transit which the contractor was expected to cover by marine insurance.

The contractor was required to purchase all necessary equipment approved by the engineer. Cost of equipment included all expense incurred up to its delivery at the site of the work, and the **percentage** was computed on this cost.

(Note: Paragraphs in the specifications relating to the purchase of equipment and materials outside of Panama should have stated a fixed purchasing commission to be paid the purchasing agent whether the contractor or otherwise and should have provided for making purchases jointly with a representative of the government at the option of the government.)

The law required and the specifications clearly indicated that the contractor should shelter and subsidize his employees in sparsely inhabited regions.

(Note: Provisions should have been made for a more complete control by the engineer of subsistence as a means of increasing the health, endurance and efficiency of laborers. This provision is of special importance in Panama where the laborers are weak and inefficient on account of inferior and unbalanced rations, and the prevalence of malaria and hookworm.)

Provisions were made for the prompt payment of the contractor's certified and approved bills. If payment was delayed on monthly accounts more than 15 days the contractor was allowed interest at the rate of 8% per annum.

Details of construction were controlled by the Illinois "Specifications for Road Work" dated January, 1920, and those for "Bridge Work" of April 1920, in so far as they were applicable.

(Note: These detailed specifications conform closely to the tentative specifications of the Bureau of Public Roads, Washington, D. C., which would have been used, if copies had been available, as standard methods of construction.)

The usual power to inspect the contractor's accounts and to control the successive steps of surveys, designs and the preparation of the estimate by the

contractor was vested in the engineer. The **percentage** was computed on the actual cost of such work.

The contractors' estimate was based on quantities and unit costs of construction items including 10% for contingencies and an equitable proportion of expenses of administration, but not including cost of equipment, surveys and other investigations necessary to preparing an estimate. When this estimate which was subject to a joint revision was approved by the engineer, it was defined as the "officially adopted estimate" and was the base for computing the percentage.

Costs

If the actual cost of construction exceeded this official estimate the loss was to be equally divided between the government and the contractor up to one-half of the contractor's percentage. Further loss was to be carried entirely by the government. If the cost was less than the estimate, then the savings were to be equally divided up to a total saving of 20% and any further savings were to the account of the government. For example, if the contractor's bid was 8%, then his possible minimum percentage on construction costing eight or more per cent more than the official estimate would be four per cent of the official estimate and his maximum percentage if the actual cost of construction was less than 80% of the official estimate would be 8% plus 10% or 18% of the estimate.

In case of disagreement methods of arbitration were specified, one arbitrator to be appointed by the Commission, one by the contractor and the third by these two arbitrators. (No provision was made in case of a dead-lock.) Their decisions were to be final and binding, the contractor agreeing not to resort to diplomatic procedure. Each party was to pay the fee of its arbitrator and prorate other expenses of arbitration proportional to the difference between the sum fixed by arbitration and their respective claims.

From the above notes on a few of the paragraphs of the specifications it is evident that the successful operation of these "cost plus percentage" contracts depended in a large measure upon the capability, fairness and honesty of both parties to the contract.

Bids

Advertisement for proposals were made January 3, 1921, for a period of 45 days. Copies were distributed to the Panamanian Consuls in various foreign countries and published in local papers and in the Engineering News-Record. Two contracts were awarded in March, one to an American and one to a Panamanian company, the percentage bid being 5 1/3% and 9% respectively. The length of the preliminary routes selected for survey and construction was about 135 kilometers located in the central provinces having the greater agricultural development and the larger population. Both companies commenced work promptly. The government unfamiliar with such contracts was inclined to modify

and change certain important paragraphs of the specifications regardless of the terms of the contract. Such changes might have benefited several small local firms but would have been serious for the contractors. They deprived the contractor of his rights to make the authorized purchases, to subsist his employees and to select and fix the salary of his employees. These differences were finally adjusted during the fall of 1921 to conform closely with the contract ratified in March, especially in the case of the American firm which had done excellent technical work and had strictly complied with the letter and the spirit of the contract.

In general the main trunk lines must parallel the coast and the expenses for bridge construction will be heavy. The Republic is not within the typhoon or hurricane belt. Its rainfalls are of short duration but of intense rates. Special studies are necessary of the runoff of each drainage area in a region of such heavy precipitations and the only reliable data were the records of the Panama Canal. The annual rainfall of the Pacific side is slightly more than one-half of that of the Atlantic. The proposed roads are all located on the Pacific side and it was estimated that a maximum daily runoff of nine centimeters for small areas of moderate slopes should be provided for. This runoff may be doubled for culverts draining small steep areas and reduced to three centimeters for the larger rivers.

Type of Road

The general type of road selected for construction where so little traffic has been developed was a macadam road with three and one-half meters of surfacing and shoulders one and one-half meters wide, to be ultimately developed into a macadam or concrete surface four and one-half meters wide with shoulders of one meter when increasing traffic merits such construction. While the rapid introduction of autos and motor trucks will immediately follow road construction, their number will be relatively small until agricultural production has been greatly expanded. In the meanwhile the people must learn to use roads, to shoe draft animals and to adopt wider tires for their ordinary traffic which will continue to be of local importance for several years. They must learn how to maintain roads and to provide maintenance funds by methods that can and will be enforced. It is an extravagant wasteful policy for any country to construct a system of roads without providing for their efficient maintenance, a policy which must quickly result in a dismal failure and in a serious delay to any progressive plan for road construction.

Another type of contract based on unit prices was prepared covering ten kilometers of road. The first four kilometers were concrete six meters wide and the remainder bituminous concrete five meters wide. The first portion was adjacent to a street railway and practically a city street, the

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STORAGE YARD FOR SUBWAY TRAINS

By ARTHUR E. CLARKE '02

Description of excavation problems encountered, and method of drilling and blasting used on this contract

AN INTERESTING PIECE of construction work has just been completed by the Oscar Daniels Company of New York under a contract between that company and the City of New York.

This contract covered the construction of a storage yard for subway trains with a capacity of twenty-five ten-car trains; the construction of a two-track lead from the main elevated structure in Jerome Avenue to the storage yard; a concrete fence about thirteen feet high around the outside of the yard to serve the purpose not only of an enclosure but also as a screen to hide the trains from view. The contract also included the installation of a drainage system connecting the yard property with the City sewer system, and the reconstruction of certain piers of the existing elevated structure.

Preliminary Work

The yard, which is the subject of this article, is situated in Bronx Borough, just west of Jerome Avenue and just south of Moshulu Parkway, in property originally taken by the City for the purpose of constructing Jerome Park Reservoir, which project was later partially abandoned, leaving a considerable area of land available for other purposes. A part of this property has been utilized as a storage yard for the Jerome Avenue Line, or west branch of the Lexington Avenue Subway.

Prior to the beginning of construction work, there was a hill of considerable height near the center of the yard site and near the southwest corner of the site excavation had been carried to a depth of some twenty feet as a part of the work of excavating for the proposed reservoir. The elevation of the top of this hill was approximately 269, while the elevation in the cut at the southwest corner of the yard was approximately 206, making a total difference in elevation between the point of extreme cut to that of extreme fill of 63 feet. The grade of the finished yard varies from elevation 233.7 to 242, the yard being about 810 feet long and 350 feet wide, exclusive of the lead.

From the test borings made before the beginning of construction, it was estimated that there was approximately 64,000 cubic yards of rock excavation and 64,000 cubic yards of earth excavation to be done. As a matter of fact, as the work progressed it was found that there was considerably more rock

excavation and less earth excavation than was originally estimated.

Contractor's Plant

After the contract had been awarded, the contractor decided to put a large plant on the work and complete the main excavation in as short a time as possible. He therefore procured a 2½ yard bucket Bucyrus steam shovel, narrow gauge side dump cars with a capacity of four cubic yards each, the necessary narrow gauge railroad tracks, two well drilling machines with which it was possible to drill 4" holes to be used in blasting, together



Fig. 1

A portion of the contractor's plant at work on the cut.

with a battery of Jap drills. He also set up a compressor plant with a capacity of 1500 cubic feet of compressed air per minute, a blacksmith shop, storehouse and office, and erected one timber derrick and one steel derrick at points where they might be used advantageously in the handling of excavated material.

Excavation and Blasting

The steam shovel was first operated along the easterly side of the yard, from north to south, where it was possible to remove a trench about 35 feet wide, entirely in earth excavation. After the completion of this trench, the workings were either entirely or largely in rock. A rock or earth and rock face varying up to a height of about thirty feet was exposed as a working face. Well holes were drilled approximately 10 feet apart on a line 10 to 15 feet back of the rock face. At or near the base of the working face; that is, just above the subgrade of the yard, a series of horizontal holes were drilled from the rock face back to the line of the well holes. The drilling of these horizontal holes was of interest on account of the fact that



Fig. 2

This photograph shows the finished wall, and the sub-grade ready for ballast and tracks.

longer drills were used here than had been successfully tried heretofore. The usual butterfly drill made from hexagonal hollow bars were used for this work. The contractor had a drill sharpener which worked by compressed air and experimented with the length of drill which it was possible to use advantageously. It was found that by starting the hole with a five or six foot drill, longer drills could be substituted as the depth of the hole increased, until a twenty foot drill completed the hole. Because of the fact that the drills have to rotate while working, it is necessary to keep the hole in good alignment. For this purpose each drill was arranged so as to be supported by and run along a timber guide or horizontal table prepared for that purpose. These horizontal holes were spaced about 4 feet to 5 feet apart. In shooting the holes, a few sticks of dynamite were placed in the bottom of each well hole and shot with comparatively little packing. This resulted in what is called "springing the holes", or forming at the bottom of the 4" hole a cavity in the rock in which may be placed as large a charge of dynamite as was necessary to use in order to break up the rock in pieces of such size that the shovel could handle them. The well holes were loaded at the bottom with from fifty to one hundred sticks of dynamite, after which the holes were rammed with sand to a point about eight or ten feet below the surface, where ten or twelve sticks of dynamite were introduced in order to hold the lower charge from blowing out of the hole. The small horizontal holes were loaded and acted as lifters. As a rule, from three to five well holes and the corresponding horizontal holes at the base of the rock face were shot at one time. Where the working face was twenty or twenty-five feet high, the shooting of these well holes usually resulted in the moving of about 1,000 to 1,500 cubic yards of rock. The contractor excavated and removed by means of the shovel plant as much as 1,000 yards per day.

On the easterly side of the yard, precautions had to be taken to protect the buildings in the vicinity. On the westerly side of the yard, the work faced the unused reservoir basin and the Department of

Combustibles allowed the contractor to shoot heavier blasts than would be usually allowed within the City limits. On the easterly side of the yard, after the blasts had been fired, the steam shovel excavated the broken rock and loaded it on the dump cars, which were then drawn by means of small locomotives to the dump within the reservoir property. The material shot out along the westerly side of the yard was handled by means of derricks set in such a position that they were able to pick up either pieces of rock or skips loaded with broken stone and deposit this excavated material in the bank where fill was required.

In a great many instances, the material blasted from the west side of the yard was thrown directly into the fill by the blast, so that it did not require further work by the contractor in the way of disposal.

The Lead Tracks

The contractor started excavation by means of the steam shovel on November 27, 1920. On August 10, 1921, all the heavy excavation work amounting to 28,980 cubic yards of earth and 77,536 cubic yards of rock had been removed. Simultaneously with the taking out of the main excavation, the contractor excavated for and constructed several masonry piers along the westerly side of Jerome Avenue, upon which piers was built the steel structure forming the approach to the yard. Along Jerome Avenue the tracks forming the approach or lead to the yard are carried on a steel structure of the usual elevated railway type, consisting of steel columns, cross-girders and stringers. As the approach leaves the main structure, however, passing over a narrow strip of land connecting Jerome Avenue with the yard proper, the type of structure changes to one where heavy I beams are carried on rubble masonry piers, these piers being spaced about twenty-three feet apart and decreasing in height as they approach the abutment so as to bring the base of rail of the approach tracks down to meet an established base of rail in the yard proper.

Figure 1 shows the drilling and excavating of rock in progress. Note well drill, top of derrick

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SCHOOL NOTES

THE MASQUE

"Listen to Me" the Masque's musical comedy production for 1922 was a howling success. So say the Junior Week guests and "they rule the Hill" during Junior Week. But we're just putting in our few lines to say that without several C.E. men the Masque would not have been as howling a success as it was.

For this season, both the Manager of the Masque and the Assistant Manager are C.E. men. This is an honor which ought to make the red bricks of Lincoln Hall blush with pride. Ross Anderson, '22 is Manager and Jim Towart, '23 (he hails from Montour Falls but you can't hold that against him) is Assistant Manager. They belong to the clan whose work is the most important yet whose accomplishments are seldom or never seen.

Now for the Civil Engineers whose work is seen on the Masque stage, that is, the actors and actresses. Shorty Peters, '23 played the part of Llewellyn Collins, a susceptible sub-deb. We always knew that Jordan Holt was cut out for an actor or rather, an actress. Yep, ever since some cuss nicknamed him after one of the famous movie comedians. No, we're not referring to Charlie Chaplin. Name furnished on request. Petey as Llewellyn had the sweetest woman's voice of anyone in the Masque. He acquired it out at Summer Camp by yelling at the rear rodman in an effort to wake him up.

Van Mitchell, '23 covered himself with glory or, more aptly, with a woman's wig and feminine apparel. We almost mistook Van for a regular girl but for the fact that we could see that his complexion was just a wee bit roughened by the many rigorous days he spent out on the railroads last fall. It is too bad that the rouge was ineffective in

hiding "the tell-tale evidence". Rene Buenano, '23 who claims Buenos Aires as his roost was another C.E. member of the women's chorus. Rene was the nearest approach to a Spanish senorita we've seen since we've been these $42\frac{1}{2}$ degrees north of the equator. You ought to have seen her wiggle his shoulders! Rollo Sernggs, '22 another one of our C.E. choreens had most of the collech boys in the audience waiting at the stage entrance for her after the show. One of them invited her to tea at the Wisteria. H. E. Hertz, '25 Eng. was a "tres petite" coleen. Hertz is not yet quite sure whether he's going to room in Lincoln Hall next year, but he says the chances are good. It is quite significant that S. I. Dower, '25 played the part of Mr. John Collins, Llewellyn's stormy parent. Strange that a C.E. frosh should play the oldest part in the show. But, he made a good old man. Wonderful, what a costume will do!

C.E. BASKETBALL

We have read editorials and heard talks on the poor condition of C.E. Athletics until it seems there should be a stronger attempt on the part of the students to improve this situation. The soccer team did not have very wonderful success last fall. When "Fritz" hung up the sign "All out for basketball" the opinion of the majority was that here was the chance for the School to get back to the old status in Inter-College athletics. About fifteen men came out for the team and all worked hard to make good and things certainly looked bright for a successful season.

In the first game, that with Architecture, there were about ten men on the side-lines in suits and every man on the team knew that if he retained his place he would have to do his best. We won

that game with a score of 31 to 3. The line-up consisted of Schreiner, center; Becker and MacWilliams, forwards; MacManus and Newton guards. Several shifts were made, Becker for Schreiner; Garfinkle for Becker and Berg for MacWilliams.

After this game, the fellows seemed to lose all enthusiasm and only enough to form one team continued to come out for regular practice. Consequently, when we met the Chem. five, we had had only a small amount of practice and the Chemists were the victors in a loosely played game. In marked contrast to the Arch. game there was only one substitute on the bench. The line-up was the same as in the other game.

By almost begging the fellows to come out for practice we were able to get in two or three hours of good practice before the game with M.E. They had won three games and lost none, and the "dope" was that they would again be the victors. However, the team came thru with a lot of fight and played a game that was unusually clean and fast, marked with extraordinary team work. C. E. won with a score of 21 to 15. Berg and MacManus were the stellar performers thru-out the contest. The line-up was Berg and Garfinkle forwards, Becker center, and MacManus and Newton guards. It remained unchanged during the game.

Having defeated the best team in the league and being on equal footing with the leaders for first place, we were a bit inclined to become overconfident and the result was a defeat by Vet in our last game with a score of 14 to 12. Only four men were out and it was necessary to hunt for another man to start the game. A spectator remarked after the game, "I thought that football was played in the fall", and that tells the whole story,—poor basket shooting and inefficient guarding. The line-up: Becker, center; Garfinkle and Josephson, forwards; and MacManus and Newton, guards.

There are three more games on the schedule, Law, Ag., and Arts. Each college is well represented and it is certain that the contests will be of the highest order IF ENOUGH MEN COME OUT FOR PRACTICE SO THAT TWO C.E. FIVES CAN BE FORMED. Remember fellows, we all have a part to play if we would maintain a high place in Inter-college athletics. A team can play 50% better if there is a good crowd out watching it and rooting hard. Watch the bulletin board for games and plan to give the team your support when these games are played.

A WISE CRACK (IN GRANITE)

Prof. Ries, who thrills the sophomores with vivid descriptions of geologic applications to engineering problems, aroused the latent humor of the class recently with this choice pun: "While discussing the troubles caused by glacial deposits we ought not neglect the case of Cedar Creek (and then he made a most ineffective pause) dam near Seattle.

HOSS THIEVES?

All Lincoln Hall was bewildered and amazed to read the following note on the main bulletin board at the south end of the first floor: "Will the Gentlemen Engineers who removed the drawing boards from Room 16, the Cartography Room, kindly return said boards and so save the owners from the embarrassment of stealing boards from some other class?"

This notice, we are almost certain, was posted by one of the foresters who take the cartography course. By what right, we inquire, has a mere forester to slur and publicly defame the good name of the sons of Lincoln Hall by referring to them as "Gentlemen Engineers". Whether these same "Gentlemen Engineers" will stand for being slurred like this is also another matter which would bear our inquiry. But, all seriousness aside, we think this was quite a joke—frankly, quite a frosh trick. The foresters are really harmless. The members of the class of '23 spent all summer with them up at the Summer Survey Camp at Kings Ferry. The Juniors report that the Foresters belong to the class which tote guns and use strong language all the time but when it comes to a show-down not one of them would hurt the left ear on a flea's head.

For the information of these self-same foresters we would say that on account of the poor facilities provided for the looking up of large drawing boards in Lincoln Hall, the boards have become common property. In fact, this matter has become a college tradition with Lincoln Hall. The other day we ran across this inscription on a board which was loafing in the bridges drafting room: "Dedicated to the use of the students in all the classes which follow mine. May they swear over this board as I have done. J. J. Harvey, '98½".

DANNY KING

During the regime of Danny King as chief janitor of Lincoln Hall things were a lot different and students conducted themselves in a manner quite different from those of today. For the information of the present day occupants of Lincoln Hall, Danny was chief of the domain before the advent of our present "Dean" Larsen.

One of the old grads made a visit to Ithaca some years ago during Danny's reign and this is what he reports: Danny lamented over the fact that the students of today are very much different than those of the old grads' time. Said Danny, "Would you believe it, why the boys here today don't even chew tobacco". And he followed this with an eloquent exposition on what he would do if he could have the old boys back.

It seems that on account of so much chewing of tobacco sand boxes were provided at various strategic points in the building. The old boys, being as careless as the present tribe of students, used to

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ALUMNI NOTES

In Memoriam

HIGH COURAGE SHOWN BY CORNELLIAN AT KNICKERBOCKER THEATER DISASTER AT WASHINGTON

A. G. F. Buehler '11 Waits for Rescue Asking That Others be Helped First. Dies Shortly After Rescue.

Albert G. F. Buehler of the class of '11 has highly honored Cornell, giving the full measure of service and devotion as the outstanding hero of the Knickerbocker wreck in Washington, D. C. The story of Buehler's heroism in refusing rescue, while lying mangled beneath the debris, pointing to others who seemed more in need of immediate help, and trying to direct the rescue parties as life was slowly ebbing away, was related by the New York Times as follows, "Many brave deeds were reported today by rescuers working in the Knickerbocker Theater wreckage. They said that A. G. F. Buehler was the outstanding hero, giving his own life that others might live. He could have been taken from the debris fully an hour before he was, but directed the rescuers to aid others whom he declared were more seriously hurt than he. He died after being taken from the building."

Buehler was born in Baltimore, Md. His high school training was received at the McKinley High School of Washington, D. C. He then came to Cornell, entering in 1907 and receiving his C.E. degree four years later. In 1911 he was elected to Sigma Xi honorary engineering fraternity. After leaving Cornell he attended the Georgetown Law School of Washington, D. C., going to classes in the evening while working for the Government as Assistant Examiner of Patents during the day. Here he received the degrees of LL.B. and M.P.L. In 1911 he entered the U. S. Army, serving as 1st. Lieutenant in the Ordnance Dept. A year later he was promoted to a Captaincy, serving in this rank until 1919. After leaving the service he was employed as a Patent Attorney and continued at this work until the time of his heroic death.

Buehler was a member of the Hobasea Lodge, No. 716, F. and A.M. of Ithaca. A masonic burial was held from Buehler's home in Washington.

Clifford M. King, '04

Clifford M. King, '04, died on January 2 in Cleveland, Ohio. Captain King was born in 1879, and graduated from Western Reserve University in 1901. In 1904 he received the C.E. degree at Cornell. He was one of the honor men in his class, and a member of Sigma Xi.

After leaving Cornell, he was engaged in irrigation work in the Far West, but in 1908 he became city engineer of the City of Sandusky, Ohio. During the war he was with the 528th Battalion of Engineers overseas. When he returned he entered the city engineering department of Cleveland. Captain King was in the Ohio National Guard during the Spanish-American war.

Harold Ingersoll Bell, '05

Harold Ingersoll Bell died in New York City on December 28, 1921.

Bell was born August 16, 1880, in Canton, Ill. He prepared for college at Bay City, Mich., High School, and spent a year at the University of Michigan. Entering Cornell in 1901, he received his C.E. degree in 1905. He was a member of Rod and Bob.

Since 1906, Bell was with the H. P. Cummings Construction Company of Ware, Mass. In 1912 the company opened an office in Portland, Maine, of which he was made manager. He was in charge of construction of a number of large plants in Maine, the best known being the hydro-electric development of the Rumford Falls Power Company, Rumford, Maine. He was an associate member of the American Society of Civil Engineers.

He was married on April 27, 1916, to Miss Ellen Morrell Foster, daughter of Mr. and Mrs. T. D. Foster of Ottumwa, Ia. They made their home in Portland. She survives him with their two sons, Hugh Foster and Gordon Humphrey, his mother, Mrs. Mary E. Bell of Ithaca, and two sisters, Mrs. Leonard H. Smith of E. Orange, N. J., and Mrs. F. J. Howe (Bertha S. Bell, '08) of Rochester, N. Y. He was a cousin of Miss Elizabeth Ingersoll of the University Library staff.

Henry Turner Eddy, '70, Ph.D. '72

Henry Turner Eddy, dean emeritus of the University of Minnesota, died at Minneapolis on December 11, 1921, of pneumonia, complicated by heart weakness.

Dr. Eddy was born at Stoughton, Mass., June 9, 1844, the son of Henry Eddy, Yale '32, Congregational minister, and Sarah Haywood Eddy, a graduate and teacher of mathematics at Mt. Holyoke Seminary.

Dr. Eddy graduated from Yale, A.B. '67, Ph.D. '68, A.M. '70, Hon.ScD. 1912; Cornell, C.E. '70, Ph.D. '72; and Centre College (Ky.) LL.D. He studied mathematical physics at the University of Berlin and at the Sorbonne and the College de France, Paris, in 1879-1880.

He was an instructor in Latin and mathematics at the University of Tennessee, 1868-9, and was as-

sistant professor of mathematics and civil engineering at Cornell, 1869-73, during which time he received his degree of C.E. ('70) and later, the first degree of Ph.D. conferred by Cornell ('72). In 1873-4 he was adjutor professor of mathematics at Princeton. He was professor of mathematics and astronomy and civil engineering, and dean of the academic faculty, 1874-7, at the University of Cincinnati, and was its president-elect in 1890. The following year he went to Rose Polytechnic Institute, Terre Haute, Indiana, as its president, remaining there until 1894, when he resigned and went to the University of Minnesota as professor of engineering and mechanics, in the College of Engineering. In 1906, he was elected dean of the Graduate School, which position he held until his retirement from University work in 1912 as professor and dean emeritus.

After his retirement at 68 years of age, Dr. Eddy formed an association with Mr. C. A. P. Turner, consulting engineer, of Minneapolis, and spent several happy years in mathematical researches concerning properties and stresses in reinforced concrete floor slabs, the results of which he published in collaboration with Mr. Turner. He was one of the first to take up the subject of graphical statics, publishing in 1878 his well-known treatise, "Researches in Graphical Statics". In 1879 he published a treatise on Thermodynamics. Previously, he had written a mathematical text on "Analytical Geometry".

Dr. Eddy was a member of several scientific societies of varied interest. He belonged to the American Association for the Advancement of Science, being one of its vice-presidents in 1884. He was also a member of the American Philosophical Society, the American Mathematical Society, the American Physical Society, and the Society for the Promotion of Engineering Education, of which he was an honored past president. His many valuable contributions to the various societies to which he belonged indicated that he was a man of versatile attainments.

In 1870, Dr. Eddy married Miss Sebella Elizabeth Taylor, of New Haven, Conn., who died on September 5, 1921. The surviving children are: Horace T. Eddy, Omaha; Mrs. Charles F. Keyes, Minneapolis; Mrs. Clive Hastings, Atchison, Kan.; Mrs. Charles H. Patek, Minneapolis, and Mrs. J. B. Frear, Buffalo, N. Y.

Francis A. Mack, '12

Francis A. J. Mack died on October 4, 1921, following an operation for appendicitis.

Mr. Mack was born in Syracuse, N. Y., August 1, 1890. He was educated in the Syracuse public schools, and graduated from the Syracuse Central High School in 1908. In the fall he entered Cornell, and received his C.E. degree in 1912. He was a member of Pyramid.

From June, 1912 to October, 1913, he was engaged in steel and concrete construction work with Driscoll Brothers of Ithaca. Then he was with the State Department as rodman and later as leveler in charge

of construction work. In January, 1918, he entered the employ of the Public Service Commission of New York City as a Junior Engineer, working on the final estimates for the Seventh Avenue Subway.

In May, 1918, he was inducted into the U. S. Army and went to Camp Meade as a First Class Private in the 1st Battery of the 4th F.A.O.T.C. During July he was transferred to Camp Taylor in the 10th Battery, F.A.C.O.T.S. He was commissioned a second lieutenant August 31, and September 7th found him with Battery A, 14th Reg., F.A.R.D., at Camp Jackson, where he remained until October 5th when he was sent to Fort Sill in the School of Fire Field Artillery. He was honorably discharged from the Army on December 13th, 1918.

After his discharge from the army, Mack resumed his duties with the Public Service Commission of New York until January, 1920, when he became connected with the Alva Ferguson Company of New York City. He remained with the latter until shortly before his death.

He is survived by a brother, Dr. Paul T. Connolly, who is also a graduate of Cornell, class of '18.

Alumni Notes

'92. The following note concerning Joseph Michaelson, '92, was sent to us by Lieutenant Robert E. Bassler, '17: Joseph Michaelson was appointed a member of the naval contingent of engineers by Secretary Denby to investigate the causes of the Knickerbocker Theatre disaster in which 96 people lost their lives on January 28, 1922, at Washington, D. C. The other members were Comdr. G. A. McKay, C. E. C., U. S. N. and Mr. R. F. Bessey. Mr. Michaelson is a designing engineer for the Bureau of Yards and Docks, Navy Department, Washington, D. C. He lives at 1234 Girard Street, N. W., Washington, D. C.

'93. Herman M. Freeman is a member of the firm of Freeman and Winston, Consulting and Civil Engineers, West Orange, N. Y.

'95, MCE '98. J. Springer Swindells is consulting engineer with J. A. Benschel, 16 E. 41st Street, New York City.

M. E. '97. J. Walter Ackerman, M.E. '97, has recently been appointed city manager of Watertown, N. Y. Since June, 1920, he has served as superintendent of the water, light, and power department of Watertown, and before that he was for many years the city engineer of Auburn, N. Y. The experience of Mr. Ackerman affords an interesting illustration of shifting in practice from one field of engineering to another.

'07. Laurence J. Conger is a director and sales manager of the Corona Typewriter Company, and also a director and secretary of the Airdry Corporation, manufacturers of Airdry, an electric device

designed to eliminate towels in public buildings. He lives at Groton, N. Y.

'08. Word has been received from Juan A. Aguilar, of the birth of a future Cornellian, Juan Edwards Joaquin, on June 24, 1921.

'10. Lynn Crandall is the commissioner for the U. S. District Court, District of Idaho, in litigation affecting water rights in Big Lost River Valley, Idaho; and in charge of the distribution of water in Big Lost River and tributary streams, a study of the use of water in the valley, and of detailed ground water investigations to determine the effect of storage in the Mackay Reservoir on the water supply available. His address is Mackay, Idaho.

'10. Chester H. Loveland has left his position of Chief Hydraulic Engineer of the California Railroad Commission and has opened offices in the Merchant Exchange Building, San Francisco, Calif., for consultation and practice with special reference to irrigation, reclamation, and domestic water supply.

'10. Percy S. Monk is Structural Engineer for Bruno Janssen, architect, with offices at 802 Century Building, Pittsburgh, Pa.

'11. Samuel A. Graham and Mlle. Julie Meichle of St. Gallien, Switzerland, were married on August 17, 1920, at Sydney, Australia. Mlle. Meichle had been in New York for five years, and made the trip to Sydney alone, traveling via Chicago, Salt Lake City, San Francisco, Honolulu, and Samoa. Graham, who has been in Australia for more than two years, is manager of the Tanners Trading Company of Australia, Ltd., an American company registered in New South Wales, and does a large business exporting hides, skins, leather, etc., to the United States and England. He may be addressed in care of the company, 114 Hunter Street, Sydney, Australia.

'12. Matthew M. Bird is with Nagle, Witt & Rollins, Consulting Engineers, Dallas, Tex.

'12. Shirley C. Hulse is Field Engineer on the Clarion River project of H. D. Wallbridge and Company, and is located at Foxburg, Pa.

'12, '14. Louis I. Zagoren, '14 has recently formed an association with Maurice M. Wyckoff, '12, in the Wyckoff Engineering Corporation, engineers, contractors, and builders, with offices in the Woolworth Building, 233 Broadway, New York City.

'13. Mr. and Mrs. M. A. Spamer of Hagerstown, Md., announce the birth of their son, William Arthur on January 12.

'14. Albert C. Dunn is acting as secretary of the Richmond, Va., chapter of the American Association of Engineers. He is a highway engineer with the U. S. Bureau of Public Roads, and his mail address is Box 415, Va.

'14. Louis A. Rodenhiser is now located in Dundee, Texas, working on a big irrigation project to furnish water for the City of Wichita Falls, Tex., and to irrigate about 100,000 acres.

'14 Adrian K. Webster is engaged in farming and

stock raising in Vega, Texas, and writes that he should be glad to have his friends stop off and visit him when passing through for he feels sure they would like the plains country even if it is pretty dry just now. He says there is considerable excitement at present over oil and gas near Amarillo.

'15. Harry L. Goodwin is now with the Benedict Company of East Syracuse, N. Y.

'15. Frederick H. Rayfield gives his address as 2 Peachtree Place, Atlanta, Ga.

'15. Martin Steljes is District Engineer for the Concrete Steel Company, 42 Broadway, New York City. He lives at 1419 Clinton Avenue, Bronx, N. Y.

'16. Ying Lo is Engineer of Maintenance of Way for the C. G. R. Tientsin Puckow Line, Tientsin, China. His address is Hae Don Hon St., Nan Chang, China.

'16. Captain Gilbert E. Parker has been transferred from Fort Snelling, Minn., to the Tank School Camp Meade, Md.

'17. "Gabe" E. Lund expected to return to New York in January, having completed the construction of a sugar mill at Cayo Mambi, Oriente, Cuba. Mrs. Lund and their little son will accompany him as further work in the plantation will not be undertaken on account of the business depression. His New York address is care J. H. Early, 25 Pine St.

'17. Arthur W. Mellen is with the Brooklyn Crozite Brick Corporation with works at East New York and Utica Aves., Brooklyn, N. Y.

'17. Leroy P. Raynor, hydrographic and geodetic engineer with the Coast and Geodetic Survey, is on duty as executive officer on board the U. S. S. *Marinduque*, with the rank of lieutenant.

'18. James W. Fitzgerald is assistant cashier of the National Exchange Bank, Clayton, N. Y.

'18. Benjamin Friedenbergs was promoted on June 26 to the position of hydrographic and geodetic engineer with the United States Coast and Geodetic Survey with relative rank of lieutenant in the Navy. He is stationed at Manila, P. I., and may be addressed in care of the Director of Coast Surveys, Manila.

MCE '18. Chia-Chi Huang has left the McClintie-Marshall Construction Company for whom he was working at New Orleans and has returned to China. His address is c/o Mr. H. Penn, 441 Ming Hao Li, Hardoon Road, Shanghai, China.

'19. The engagement of Frederick Eisenbrandt to Miss Helen M. Schrader ('19 AB) was announced during last summer.

'19. James H. Lynch is President of the Hornell, N. Y., Chapter of the American Association of Engineers.

'20. Alger E. Hunkin, building superintendent of the Hunkin Conkey Construction Company of Cleveland, O., is now in charge of an addition to the plant of the Aetna Rubber Company of Cleveland, of which Edmund T. Slinkard (B.S. '16) is secretary-treasurer.

'20. I. Hsiang Pei is a professor in the municipal

engineering department of the Tangshan College, Chiao Lung University, Tangshan, China. He writes that Chung Chen Lo, '10 is Principal of the same college, while Thomson Mao, '17 is Assistant Principal, and William E. Patten, Jr., '11, is a professor in the hydraulics department.

'20. Anton A. Pregler is checker of drawings for an electrical survey of New York City by the New York Edison Company. At present he is anxious to connect with a firm that specializes in hydraulic engineering and hydro-electric power plant development, and would be pleased to hear from any fellow Cornellian who could give him suggestions. His address is 859 Main Street, Stamford, Conn.

'20. Joseph M. Smook, formerly designer and draftsman in the construction department of the Stonega Coal and Coke Company, Big Stone Gap, Va., has been appointed Aid with the U. S. Coast and Geodetic Survey and is now located in Wisconsin.

'20. Paul M. Van Camp has gone to China and may be addressed in care of the Methodist Missions, Peking.

'21. Harold I. Hettinger visited us recently. He was on his way to Venezuela where he has a position on triangulation control of the survey of 5,000,000 acres of land for the Venezuelan Sun, Ltd. His address will be in care of this company at Apartado 34, Maracaibo, Venezuela.

NEW MAILING ADDRESSES

- '86 Charles H. Baker, West Palm Beach, Fla.
- '11 Samuel A. Graham, c/o Tanners Trading Co., 114 Hunter St., Sydney, Australia.; Harold J. Patterson, 1070 Carroll St., Brooklyn, N. Y.; Horace A. Vanderbeek, Wusih Technical School, Wusih, Kiangsu, China.
- '13 Harvey T. Munn, 326 Iowa Building, Tulsa, Okla.
- '15 Frederick H. Rayfield, 2 Peachtree Place, Atlanta, Ga.
- '16 Arthur F. Perry, Jr., c/o Southern Enterprise, Inc., 169 Peachtree Street, Atlanta, Ga.
- '17 Robert E. Bassler, 3220-17th St., N. W. Washington, D. C.
- '18 Benjamin Friedenberg, c/o Director of Coast Surveys, Manila, P. I.; Chia-Chi Huang, c/o Mr. H. Penn, 441 Ming Hao Li, Harpoon Road, Shanghai, China.
- '19 Leon G. Clay, 822 Gravier St., New Orleans, La.
- '20 Paul M. VanCamp, c/o Methodist Missions, Peking, China.
- '21 Eiler M. Christensen, 85 Ridge Ave., Grafton, Pa.; Harold I. Hettinger, c/o Venezuelan Sun, Ltd., Apartado 34, Maracaibo, Venezuela.; Marcus Sagal, 506½ E. Monroe St., Springfield, Ill.; Manuel V. Zabat, 11 Washington St., Poughkeepsie, N. Y.

CORNELL GRADUATE HEADS CANADIAN ENGINEERS

John G. Sullivan Elected President of The Engineering Institute of Canada for 1922.

AT THE ANNUAL MEETING of the Engineering Institute of Canada, held at Montreal, January 24 and 25, John G. Sullivan, '88, was selected to guide the interests of the Canadian Engineers for the year 1922, being elected president of the organization. We are particularly pleased to

be able to point to Mr. Sullivan as another Cornell graduate who has taken his place at the top. Mr. Sullivan has been engaged in railroad work in the west during the past thirty-four years and brings to the office a spirit of western enthusiasm which insures a most successful year for the Institute.



JOHN G. SULLIVAN

Mr. Sullivan was born at Bushnells Basin, New York, January 11, 1863. His engineering education was received at Cornell University where he graduated in 1888 with a C. E. degree. He then went to the west where he became connected with The Great Northern Railway, serving in various capacities in the states of Montana, Dakota, and Minnesota. He later became assistant engineer for the Great Northern Railway system in charge of work on the Pacific extension. In 1893 he took a position as assistant engineer in charge of work with the Alberta Railway and Coal Co., and the following year the position of locating engineer with the Butte, Anaconda and Pacific Railway Co. Two years later, Mr. Sullivan was made locating and division engineer with the Kaslo and Slocan Railway Co. in British Columbia and for the four years following filled various positions with the Columbia and Western Railway Co.

In 1900 Mr. Sullivan was made divisional engineer of construction with the Canadian Pacific Railway and has remained with this company until the present time with the exception of a year and a half spent as assistant chief engineer of the Panama Canal. In 1907 Mr. Sullivan was made manager of construction of Eastern Lines and was appointed assistant chief engineer a year and a half later. From

(Continued on Page IX)



UNIVERSITY NOTES

JUNIOR WEEK

Junior Week, 1922 has come and gone. By many it has been voted the best Junior Week in history. The festivities started on Wednesday evening with a Musical Clubs concert in the Lyceum Theater. After the concert the Musical Clubs held an invitation dance at the Deke House. Affairs started off with a rush on Thursday, when most of the Junior Week Girls arrived. On Thursday afternoon and evening the Masque presented "Listen to Me", a musical comedy in two acts. This was up to the usual high standard of the Masque productions. Tea dances followed the matinee and open dances followed the evening performance. Friday afternoon witnessed an international wrestling meet in which Cornell defeated McGill by 26 to 4. The Junior Promenade, the scintillating climax of Junior Week, took place on Friday evening in the Old Armory. This year the Prom was a greater success than any held in previous years. Saturday afternoon saw Cornell defeat Pennsylvania in both basketball and hockey. Penn had not lost a basketball game all season but went down to defeat by a score of 24 to 15. A tea dance given by the Independent Association was held in the Old Armory after the basketball game. Saturday evening the houses giving parties held closed dances and on Sunday the guests departed, leaving the "Hill" quite blue.

BASKETBALL

The Cornell basketball team opened its season with four decided victories won on the annual Christmas trip. The chances for a successful season were very bright, and the outlook grew more favorable with the triumphs over Colgate and Syracuse. Then the league schedule was opened in New York in a contest with Columbia. This game we lost and also the games played during the two succeeding weeks with Dartmouth and Princeton. The last two contests were played on our own court.

Despite this slump, we still have a chance to come through with a very creditable showing. The team will be minus the active support of Cornish and Porter, who became ineligible after February, due

to a term of basketball in the S.A.T.C. days. Wedell and Capron, two Sophomores, who have been playing in fine form, will probably fill the two vacancies, and we can hope for good results. A permanent line-up with a little more practice together can find a place near, if not on top, of the Intercollegiate League of Ball Tossers.

Cornell-19 On January 7, the Red and White
Colgate-15 played its first game at home, with Colgate as its opponent. The game was fairly fast and well played, the last half being marked by brilliant work on the part of the Cornell representatives.

Cornell-24 January 10 saw the defeat of the
Syracuse-18 Orange aggregation on the Drill Hall court, in a well played game.

Columbia-23 The fourteenth of the month, the Red
Cornell-22 and White team opened its league schedule, the first game being played with Columbia on their court. As the score indicates, the game was close and undecided until the last minute of play.

Dartmouth-22 One week after the game at New
Cornell-17 York, Dartmouth's ball tossers visited Ithaca and went away victorious. At the end of the first half, Cornell was in the lead, but the Green team outplayed the Red and White in the second period and added a second defeat to Cornell's list.

Princeton-24 On Friday, the 27th, Princeton set back
Cornell-19 the Ithacans for the third time this season in a game marked and marred by repeated changes in the line-up of the Cornell team. The Orange and Black representatives held the lead throughout the game but were never sure of victory, and this in spite of the shifting of the Red and White team eleven times. Had one combination been left in long enough, the score might have been reversed.

Cornell-24 The Cornell hoop artists staged a wonderful comeback in the game with Penn.
Penn-15 The Penn team stood at the head of the league and the previous showing of the Cornell

team was not enough to inspire much hope for a victory. The team, weakened by the loss of Cornish and Porter, started out with a flash of speed, surprising the visitors so greatly that they were entirely unable to recover. Wedell was the outstanding star of the game with the rest of the team playing a brand of basketball far above anything seen before this year.

ROAD BUILDING IN PANAMA

(Continued from Page 83)

principal approach to the city of Panama from the east. The maintenance of the old macadam road, built of an inferior grade of stone, had been shamefully neglected. The right of way had been seriously constricted. In some places fences had been built between the road-way and its ditch. On account of the importance of the location of this road it was proposed to make possible the ultimate construction of a street suitable as an approach to the Capitol of the nation. Surveys and designs were made administratively. The design required a width of right of way sufficient for the construction on the opposite side of the street car tracks of another concrete section also six meters wide exclusive of the space required to double track the railway. It also provided for sidewalks and for laying sewers and water pipes without breaking the pavement. Thanks to the generosity of the adjacent property owners, after an educational propaganda showing the probable future effect of such improvements upon the value of adjacent land, the necessary additional right of way was secured without cost to the government. This wider right of way was required only for the four kilometers of the concrete section. This contract called for the construction of one-half of the proposed street, the construction of the other half and the adjustment of the street railway being postponed until additional funds were available and the development of traffic merited such expenditures. The concrete section was practically completed early in September and the asphalt section at the end of the year.

This type of contract based on the unit prices submitted by the bidder the government making all preliminary investigations, designs, estimates of quantities and securing the necessary right of way including quarry sites with their access roads, etc., removes many uncertainties and is generally the more satisfactory.

During 1921 the Highway Commission reconstructed administratively some 12 kilometers of macadam road, an extension of the above described road leading out of Panama. A few investigations were started, several structures repaired and a reinforced concrete bridge built. It also took over the extensive repair of about 80 kilometers of an isolated railroad located in the extreme westerly part of the Republic, the maintenance of the road bed and

(Continued on Page IX)

THE DISADVANTAGE OF POOR LIGHTING.

As thousands of our industrial plants are operating to-day with poor lighting and in some cases with extremely bad facilities, it would seem that the importance of the subject of lighting has not been given the serious consideration by those responsible for such conditions.

Poor lighting is one of the most serious handicaps under which a manufacturing establishment can operate. First of all, poor lighting is the cause of a large number of accidents in industrial plants; and it is singular that accident reports do not yet properly classify the hazards of poor lighting, which in many cases is the primary cause of an accident attributed to what is really a secondary cause. Safety engineers and other officials who make accident reports should always consider the condition of the lighting when working up a report of accident causes, for it plays an important part in a great many casualties and is apt to be overlooked. All accidents due to poor lighting are accidents of neglect, and are preventable. The poor lighting accident hazard is clearly chargeable to management and not men. It is a difficult matter to make such progress with Safety First in a plant which has neglected to provide one of the fundamental requirements of accident prevention—good lighting.

Probably no one single factor connected with the equipment of a plant so directly affects the efficiency and inefficiency as the quality and quantity of the lighting. The curtailment of production of all working under the disadvantage of poor lighting represents a big loss each day; the poorer the lighting the less able is the working force to function efficiently. Quality and quantity both suffer, representing a preventable loss wholly removable by improving the lighting.

Under poor lighting condition, we cannot expect and rarely do we find an orderly, clean factory. Darkened places encourage careless habits and workers are often led to deposit discarded articles or material which should be deposited elsewhere. The eyesight of those who attempt to use their eyes continually in insufficient light, below nature's demands, is often affected. Too much light, such as is furnished by bright, unprotected lights, is as harmful as too little illumination; both are fundamentally wrong. Nature's own illuminant, daylight, is unequalled for our requirements of lighting.

The eye is best suited to daylight in the proper quantity. Sun glare should be avoided, and in the darkened hours proper artificial illumination provided. Daylight should be utilized to the fullest extent. It is supplied free in abundant quantity for our use. Modern invention has supplied a means whereby the interior of buildings can be lighted by daylight, and all the advantages secured which is furnished by good lighting at the smallest cost.

Industrial buildings should have as much wall space as possible devoted to windows fitted with Factrolite Glass, which insures the maximum amount of daylight and which prevents the direct rays of the sun from passing through as it properly diffuses the light.

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ROAD BUILDING IN PANAMA

rolling stock of which had been so utterly neglected that the operation of the road was no longer safe. This work was nearly completed by the end of the year. The Commission will operate the road for a couple of years in order to reorganize the entire management and eliminate many serious defects that had characterized the previous political management.

It is intensely interesting to the engineer to be able to start new work which means so much to the future development of the country, as do good roads in Panama where the volume of work done compares favorably with that done by any of our states during the first period of a good roads policy. There is a real danger of neglecting necessary technical investigations in carrying on construction too rapidly in order to meet a common popular demand. This danger was greatly reduced in Panama by the assistance available in the laboratories of the Canal Zone.

The serious remaining danger is a failure to maintain the new roads. Panama has never learned the first principles of maintenance. Upon the completion of the "cost plus percentage" now in force there should be available a sufficient number of Panamanians trained in both the construction and maintenance of roads. Until that time is reached the government should continue to employ foreign experts.

SCHOOL NOTES

(Continued from Page 87)

miss these boxes as often as not when they tried their aim. Nothing would rile Danny more than to see the boys thus desecrate his noble sand boxes. He would go around the building with an eagle eye peeled for anyone who missed the boxes. But that is all gone now. The years have changed the customs of the budding engineers. Nevertheless, old Danny solemnly confessed that if he could only have the old boys back he would let them spit anywhere.

JOHN G. SULLIVAN

(Continued from Page 91)

1911 to 1918 he occupied the position of chief engineer of Western Lines. Since that time he has been retained as a consulting engineer.

Mr. Sullivan has previously been closely associated with the Institute serving as councillor on two different occasions and also filling the position of vice-president. His membership in the Institute dates back to 1900 which was the year following his election as member of the American Society of Civil Engineers. In 1900 he became president of the American Railway Engineering Association. He is now chairman of the Manitoba Drainage Commission.

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DIAL 2445

STORAGE YARD FOR SUBWAY TRAINS

(Continued from Page 85)

and compressor plant smoke stack. Figure 2 shows the yard with excavation, embankment and grading completed, the marginal fence consisting of a thin reinforced slab about thirteen feet high supported at intervals by reinforced concrete posts also completed. This fence, in cut, was built in a trench just below subgrade, but in fill is built on rubble piers extending down to the original surface and carrying reinforced concrete beams on which the fence proper is set. Figure 2 also shows the yard ready for the placing of the track and ballast.

The contract for the construction of this yard was delivered on October 19, 1920. This contract provided for the completion of the work within eighteen months, but on account of the large working plant which the contractor put on the job, at the end of fourteen months the work was substantially completed.

Future contracts at this site will call for the laying of tracks and ballast, the construction of an inspection shed capable of housing 4 ten-car trains, and various service buildings necessary to the proper operation of the yard.

CHIPPAWA QUEENSTOWN POWER CANAL

(Continued from Page 80)

foot flume cut across the core at station 54+00. It took nearly a week to flood the canal. After the canal was flooded the remainder of the core was dredged out completing the work.

The power plant was formally opened the latter part of December. Although 500,000 horsepower will ultimately be developed at the plant, only five units developing 55,000 horsepower each will be installed for the present. Two of these units are in operation and the remaining three will be put in operation as soon as the penstocks have been completed.

Sir Adam Beek is chairman of the hydro-electric commission which put through the huge undertaking for the Province of Ontario. Frederiek A. Gaby is the chief engineer of the commission and Harry G. Aeres is the man to whom was left the task of carrying out the details of the work. Thomas H. Hogg is

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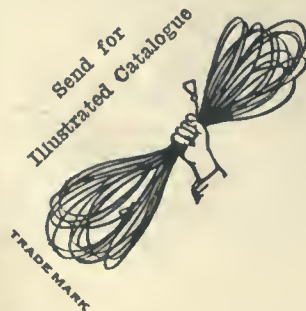
Mr. Aere's assistant and Max V. Sauer is the designing engineer.

Some idea of the size of the project may be gained from the following facts.

The total cost of the completed work will reach nearly \$100,000; the pre-war estimate being \$30,000.

The construction railway consisted of 50 locomotives, over 400 cars with 1000 freight movements a day, and 30 miles of track.

Five of the largest steam shovels in the world as well as a number of smaller ones were used. Three of these shovels are shown at work in the illustration on the front cover.

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MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

VOL. XXX, No. 7

APRIL, 1922



The Broad Street Viaduct, between Mount Vernon and Yonkers, over the New York Central Railroad, the Bronx River and the Bronx River Parkway. This view shows the construction of the coping for the balustrade with the forms in place in the foreground, and also gives a general idea of the appearance of the structure. See page 99.



The Aqueduct of Emperor Claudius

Prisoners of the Roman victories—slaves of the Emperor Claudius—were set to the task of bringing a water supply over 45 miles of hill and valley to Rome.

They labored long and in great numbers. Energy was measured then by hands and by backs to bend to the task; explosives were unknown.

Tools of metals were used to chip the rock and cut large grooves around the blocks to be excavated, wooden wedges swelled by water were used to break out the large pieces, fire was used to heat the rock which was then cooled and shattered by water. But men grew old at the task. The tunnel under Monte Salviano, $3\frac{1}{2}$ miles long, ten

feet by six, took eleven years to complete with thirty thousand laborers at work.

Today, with the aid of Hercules Explosives, San Francisco is building the Hetch Hetchy aqueduct which will include 69 miles of tunnels. An advance of 776 feet in thirty-one days was made in one heading of the Priest tunnel on this project.

At this rate, Claudius' tunnel could be driven by a few men with Hercules Explosives in less than a year.

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THE CORNELL CIVIL ENGINEER

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THE CORNELL CIVIL ENGINEER

and

Transactions of the Association of Civil Engineers of Cornell University

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Vol. XXX

APRIL, 1922

No. 7

EDITORIALS

THE ENGINEER AND THE COMMUNITY

What is the relation of the engineer to his community? Has an engineer any definite duty to perform for the community outside of the work he accomplishes in his capacity as a trained technician? Why is it that the general opinion of the layman is that the engineer does not make as good a citizen as a lawyer, a doctor or a clergyman? These and other pertinent questions would be a fruitful field for discussion by local engineering societies and chapters of national societies. The way in which they are finally answered is of fundamental importance not only to the profession, but also to the community.

For the moment let us assume that the average engineer, typical of the many in his profession, does not make as good a citizen as he should. What cause or causes bring about this condition? There must be some very important reasons for the engineers' generally accepted lack of interest in his community. The first of these is the impersonal nature of engineer's task. Throughout the greater part of his career the average engineer deals with the inanimate. Lifeless forces, silent and sombre blueprints, cold facts and colder figures represent his sphere of activity. Is it any wonder that the engineer finds little to interest him in the doings of humanity as exemplified by his community? His daily task does not give him that understanding of human nature which makes both the doctor and the lawyer good citizens and also, incidentally, betters their chance for success in life. The very nature

of his work prevents the engineer from getting that understanding of politics and public office which the lawyer unconsciously absorbs along with his daily routine. The engineer needs this understanding of politics for the very same reason that the lawyer does. It makes for better citizenship. In order to be a good citizen the engineer also needs an understanding of human nature because, in this Democracy, "The Government is the People".

The second cause of the engineer's indifferent citizenship goes to the root of the matter as thoroughly as the first. It lies in the engineer's training. What training, if any, does the engineering student receive which tends to make

him a good citizen? There is no college or university to our knowledge in this country which has a course in government or civics as a requirement for an engineering degree. The only training an engineer gets in citizenship resolves into a few weeks of civics usually sandwiched in with a high school American History course. It is unfortunate that this training is administered at an age when the student cannot grasp its full significance. We have seen the time when an Italian laborer employed on a construction job approached one of the young engineers and wished to be informed on the process necessary for the naturalization of foreigners. To say the least, it was pitiful to see the vague notion which this young engineer had of one of the fundamental institutions of our republic. Right here is where the community would benefit if all engineers were

DOES THE ENGINEER MAKE A GOOD CITIZEN?

What do you think?

Is the engineer a poor citizen? What are the fundamental causes for the engineer's apparent lack of interest in his community? Can they be remedied? If so, how? Can the engineer help solve the problem of Americanization?

In an early issue, the Cornell Civil Engineer will conduct a forum on these questions. Have YOU an opinion?

good citizens. We hear much talk of Americanization. Engineers are located in ideal situations to aid in the work of Americanizing our foreigners. Yet many of them let this golden opportunity slip through their fingers, and they will continue to pass it by unheeded until they acquire a full realization of their duties as citizens.

These two causes represent such huge obstacles to the engineer in the pursuit of good citizenship that it is doubted by some whether they can ever be overcome. They not only can be overcome, but they have been overcome time and again as proven by the many engineers in public life, of which Herbert Hoover is perhaps the leading example. There must be, then, some characteristics inherent in the engineering training or profession which aid the engineer in overcoming these obstacles. Mr. Everett J. Lake, Governor of Connecticut, stated these characteristics admirably in a speech at a banquet of the American Association of Mechanical Engineers at Hartford. He said in part:

"There are certain fundamental characteristics of a successful engineer, characteristics which he does and must apply to his profession if he be worthy of bearing the name engineer, and I wish to urge upon you your duties as citizens to apply them in your consideration of the problems of good government and the public weal. Today we often hear the expression, 'Government needs the business man in public offices', and if this be true, the need is emphatically for the engineering qualities of the business man.

"The first qualification of an engineer is concentration. He must focus on the problem like a burning glass, and not study with the eye and mind of an impressionistic artist.

"The next qualification is the power of analysis. The real analytical engineer does not tear apart with ruthless hands and throw into a scrap heap all that comes between him and the point of his ultimate investigation. He rather lays aside in an orderly and tabulated array the covering or by-products, if you will, so that they may again be replaced, if necessary, or perhaps put to other profitable use.

"The third qualification of an engineer is his power of continued application. He learns to work continuously and laboriously.

"And a fourth characteristic of an engineer is the quality of thoroughness. He must, in his task, in his problem, bring it to completion. A half-finished job in his domain is practically nothing done at all.

"These, then, are the fundamentals of a successful engineer, and if he but avoids the one danger of his profession—that of allowing his concentration to restrict his vision,—so that in the intense application to any one problem he does not see its full scope or misses an opportunity waiting at his very elbow—he becomes an ideal citizen and one of the

great assets of a nation.* * * * *

"With the same concentration, the same analysis, the same determination, the same thoroughness that you study and solve the problems of a big machine, a railroad, a river, or an excavation, study and solve the problems of government, municipal and state, and you will provide better than any other class of men a solid, firm foundation for good government."

BE SLICK

This would appear to be the premise that a few contractors work under even yet, in spite of the statement by one of the speakers at the recent convention of contractors held in Cleveland that contractors had added another word to their motto, making it "DON'T be slick".

His statement is probably true for the great majority of the contractors, but unfortunately in every profession there are the quacks and the short sighted who give their profession a black-eye. When accidents occur such as the theatre collapse in Washington two months ago in which ninety-eight people were killed, or when unfinished buildings collapse during erection such as happened in Brooklyn at about the same time, the construction profession does receive a black-eye. The Coroners jury acting in the Brooklyn case, after calling in expert aid, decided that the collapse was due to the poor work of the contractor. In the Knickerbocker Theatre Collapse the fire army and navy engineers called in by the Coroner to make a study of the case, submitted an exhaustive report in which twenty-one "evidences of work of an inferior grade for such an important structure" were listed.

Such accidents must not occur. In order to lessen or to eliminate if possible such catastrophes many of the states have licensed their engineers, and require that all responsible men on any job shall possess licenses. This, we believe, is the only solution, since it is practically impossible for contractors to form any sort of an association having powers such as the Bar Association has over lawyers. Competent engineers and contractors will not object to being licensed. In it they can see a protection against the shysters of The Profession. Moreover the law will act beneficially as a restrainer on those men, who, though they are good contractors, are swerved from "the straight and narrow" by the prospect of large though somewhat illegitimate profits. Such men will hesitate when they realize that such action may mean the loss of their license and therefore the source of their income.

Such a law has been enacted, as we have said, by some of the states. Among the most recent of these is New York State, whose law however does not go into effect until May 1923. The one great trouble with state restrictions is that they are not uniform the country over, and it is perhaps not too much to hope that at some future time the licensing of engineers will be the subject of National Legislation.

THE SITUATION AT MUSCLE SHOALS

By W. G. HOYT, '09
U. S. G. S. Water Resources Branch

A very complete and comprehensive article written in an impersonal manner, discussing the situation at Muscle Shoals and the proposals presented to the Government

History of the Project

TENNESSEE RIVER, which is formed by the junction of French, Broad and Holston rivers near Knoxville, in eastern Tennessee, flows southwest into and across northern Alabama to the northwest boundary of Mississippi and thence nearly due north across Tennessee and western Kentucky and enters the Ohio at Paducah, Ky., about 45 miles above the mouth.

The section of the river known as Muscle Shoals extends from Florence, Ala., upstream to the head of Brown's Island, a distance of 36.6 miles. Florence, which before the World War had a population of about 7,000 and in 1920 of more than 10,000, is on the north bank of the river, 213 miles downstream from Chattanooga. The drainage area above Florence includes 30,500 square miles. The low water flow at Florence, as shown by stream-flow records taken from 1895 to 1920, is about 7,800 second-feet; the maximum flow recorded is nearly 500,000 second-feet.

The width of the river through the shoals ranges from 1,000 to 9,600 feet. The total drop is about 134 feet, and in their natural state the shoals formed a complete obstruction to navigation.

The river and harbor act of March 2, 1871, provided for the improvement of navigation around the shoals by a canal on the north side of the river to be 100 feet wide and to contain nine locks having lifts ranging from 3 feet to 13 feet. The work of constructing this canal was carried on from 1887 to 1889 and the total expenditure for its construction, operation, and maintenance to date has been about \$3,200,000.

The traffic through the canal during the 20-year period from 1900 to 1920 amounted to 224,000 net tons. The traffic reached its maximum during 1906, when it amounted to 27,000 tons, and its minimum during 1918, when it was 6,000 tons. The average for the first 10-year period was nearly twice as large as the average for the last 10-year period.

Immediately after the outbreak of the World War the increase in activities of all kinds created a demand for more power. The effect of cutting off our imports was being felt and we became impressed with the great need of producing at home many commodities that we had been importing. Conspicuous among these commodities was nitrate. Just before the war the quantity of nitrogen annually required in this country was about 400,000 tons and

the normal home supply was only about 250,000 tons, so that 150,000 tons had to be imported. The increase acreage and more intensive farming called urgently for more fertilizer, but the demand of the farmers was not to be compared with the demand of the chemical industry and of manufacturers of munitions. Coupled with this demand was the difficulty in obtaining nitrate from Chile. We could produce nitrogen from ammonia as a by-product of coking or by fixation of nitrogen from the air. It was impossible to supply sufficient nitrogen to meet the war needs from the nitrogen obtained as a by-product in making coke, so we turned to methods for the fixation of atmospheric nitrogen, and a primary requisite in the economic production of nitrogen directly from the air is cheap power.

The possibility of developing power at Muscle Shoals, both independently and in connection with structures for aid to navigation, has been discussed for many years. The fairly concentrated fall and the facts that the stream flowed on bedrock and that the shoals obstructed navigation seemed to make the site an ideal one for a system of dams and locks that would materially aid navigation and furnish an enormous amount of power.

At Muscle Shoals then, there was an opportunity to develop immense power at a reasonable cost, at a location that was apparently ideal for a nitrate plant—a location near coal fields and deposits of limestone, far enough from the coast and the international boundary to be safe from possible invasion, and near lines of transportation—two railroads and the Tennessee River.

The Plants

After considerable investigation plans were prepared for the construction near Muscle Shoals of two nitrate plants by the Government, power to be supplied by steam plants until hydro-electric power could be developed. Construction under this plan was carried on from 1917 to 1920.

Nitrate Plant No. 1, on the outskirts of Sheffield, Alabama, 6 miles southwest of Florence, was constructed under an agreement with the General Chemical Co. by the Government, under the supervision of the Ordnance Department. The site includes about 1,900 acres. This plant was designed to produce 22,000 tons of ammonium nitrate per annum by the direct synthetic ammonia (Haber) process. The fixed nitrogen was to be used in making ammonium nitrate explosives. The fixation process

did not prove successful and the plant was never used. The Haber process requires little power, though it seemed to be successful in Germany only one plant in this country, at Syracuse, N. Y., has been successful. At Nitrate Plant No. 1 approximately \$13,000,000 was expended—\$7,000,000 for the chemical plant, \$1,300,000 for a 5,000 kilovolt-ampere modern steam plant, \$3,000,000 for land and houses, and \$1,000,000 for public works.

Nitrate Plant No. 2, at Musele Shoals, on the south bank of the river, was constructed under contract with the Air Nitrate Corporation. The plant was designed to produce 111,000 tons of ammonium nitrate per annum by the cyanamid process of the American Cyanamid Co. The plant was successful, and in a two weeks' test, with one-fifth of plant in operation, it produced 1,700 tons of ammonium nitrate. Ammonium nitrate is not a satisfactory fertilizing agent, but ammonium sulphate is, and it can apparently be made at Plant No. 2 without destroying its value as a war plant should the necessity for making munitions again arise. This plant includes the Waco limestone quarry, which embraces 2,700 acres, a steam plant having a capacity of 60,000 kilovolt amperes, and 88 miles of transmission line to a 33,300 kilovolt ampere Government-owned steam plant on Warrior River at Gorgas. This steam plant is really part of the plant of the Alabama Power Co., for the two are under the same roof and have joint means of ash disposal and coal supply. This nitrate plant, which includes two steam plants, transmission lines, and quarry, represented an outlay of \$76,000,000, expended as follows:

Chemical plant	\$36,000,000
Shops	2,700,000
Power house at plant	12,300,000
Power house at Gorgas with transmission line	5,000,000
Village	3,000,000
Public works and inventory	11,800,000
Operation	3,000,000

The construction of the Wilson Dam, or Dam No. 2, as it is called (Dam No. 1 being a proposed navigation dam downstream), was authorized by President Wilson by letter dated February 23, 1918, under authority contained in section 24 of the National Defense act of June 3, 1916. The plans called for a concrete dam 4,270 feet long, of which 2,890 feet was a spillway section, to create a head of 95 feet and, besides being used for generating power, to render navigable nearly 15 miles of the river. Work on this dam was carried along rapidly until April 5, 1921, when it was stopped for lack of funds. The dam was then and is still only 40 per cent completed, and the power house is about 10 per cent completed. The total expenditures and obligations to date amount to \$16,760,000.

Hydraulic Power Plant No. 3, according to the preliminary plans, was to include a concrete dam

having a total length of 6,200 feet, which would probably make it the longest power dam in the world. It was to create a head of 40 feet and to improve navigation for 63 miles.

Cost and Present Value of the Plants

The following table shows the amounts expended and the value of the plants as estimated by the Ordnance Department.

	Cost	Value	
		As going concern	As scrap
Nitrate Plant No. 1	\$12,888,000	(1)	\$ 600,000
Nitrate Plant No. 2	69,674,000	(2)	7,250,000
Warrior steam plant railroad and sub- station	3,771,000	3,000,000	800,000
Transmission line	905,000	675,000	60,000
Quarry	1,179,000	357,000	102,000
Total	\$88,417,000	\$10,032,000	\$8,812,000

(1) None except possibly that of the power plant.

(2) None except that of 60,000 kilowatt steam plant unless Wilson Dam is completed.

The value of plant No. 2 as an operating concern depends upon the price of power, according to the Ordnance Department. If power costs \$0.004 per kilowatt hour the plant has no value; if it costs \$0.001 per kilowatt hour it has value.

The Wilson Dam as it now stands is worthless and has no scrap value if it is not to be completed. So far Congress has failed either to operate the nitrate plants or to appropriate sufficient money to complete the Wilson Dam. So the Government has expended \$105,000,000 for properties which, in their present state, have a very indefinite value as a going concern and have an estimated value of \$8,800,000 as scrap.

Proposals made for the Property

Four proposals for taking over the property in whole or in part have been made to the Government, only two of which have apparently been seriously considered. One was made by Henry Ford on July 8, 1921, and substantially modified on January 25, 1922; the other was made by the Alabama Power Co. on February 15, 1922. The proposal of Mr. Ford contemplates the taking over of the entire property; that of the Alabama Power Co. relates only to the power.

The two proposals will now be considered briefly in detail.

Mr. Ford proposes to complete and construct according to Government plans, at Government expense, the Wilson Dam and Dam No. 3 at a cost of approximately \$50,000,000 (the Army engineers' estimate), and to pay the Government an annual rental, amounting to 4 per cent, on the cost of the new work, not including some \$3,000,000 for power and flowage rights at Dam No. 3 and \$17,000,000 already expended on Wilson Dam. This rental is to start six years after the Wilson Dam is installed to a capacity of 100,000 horsepower and three years

after Dam No. 3 is installed to a capacity of 80,000 horsepower, the total installed capacity of the Wilson Dam to be 600,000 horsepower and that of Dam No. 3 to be 250,000 horsepower. Mr. Ford places upon the United States the responsibility for the repairs and maintenance of the two dams, though not of the power houses and electrical equipment, but pays for such repairs and maintenance \$35,000 annually on the Wilson Dam and \$20,000 annually on Dam No. 3. He will furnish the electricity to operate the locks and will pay semi-annually \$23,373 for the purpose of building up a sinking fund which, if invested by the United States at 4% interest compounded semi-annually would amount at the end of the 100-year period to \$49,000,000. As a condition to this offer he asks the United States to sell him nitrate plants Nos. 1 and 2, the Waco quarry, the three steam plants, the transmission lines, with a clear title to all lands upon which the Gorgas Warrior steam plant and 88-mile transmission were erected. For these properties, costing \$88,000,000, and having a scrap value of \$8,000,000, he agrees to pay \$5,000,000 and further agrees to operate Plant No. 2 for the production of fertilizer or fertilizer compounds at cost plus 8 per cent and to keep the plant in readiness to turn it over to the United States at any time the necessities of war may require. The three steam plants and transmission line alone would cost nearly \$10,000,000 to construct now.

The Alabama Power Co.'s proposal contemplates only the completion of the Wilson Dam and the purchase of the steam plants and transmission lines. The company agrees to take over the Wilson Dam as it is and to complete its construction under the provisions of the Federal Water Power Act, with the usual 50-year recapture and rate-regulation clause, and to furnish the Government free the second 100,000 horsepower from the Wilson Dam for use at the nitrate plants. The company will own and maintain the dam. It offers to purchase the steam plants and transmission line for \$5,000,000. The contract under which these plants were constructed by the Alabama Power Co. for the Government gives them the right to purchase these properties.

Comparison of the Proposals

On account of the wide difference between the two proposals it is difficult to make any direct comparison between them. An attempt is made here to point out what each proposal will mean to the Government financially, to study how the power will be developed and disposed of, and to point out the probable advantage to the public of accepting one or the other proposal.

Under the plan of Mr. Ford the Government would be required to spend approximately \$53,000,000 to finish the Wilson Dam, to buy the flowage and power rights for Dam No. 3 and to construct that dam, and to give a clear title to the ground for the Gorgas steam plant and 88-mile transmission line in addition

to settlement of claims of Ala. Power Co. and Air Nitrates Corporation. The Government would, however, receive interest at 4 per cent on the actual cost of completing the Wilson Dam and constructing Dam No. 3, not including the flowage rights. The payment of interest is not to begin until six years after the Wilson Dam is completed and three years after Dam No. 3 is completed. The Government is to receive \$55,000 a year for the maintenance of the dams and locks and \$23,373 to create a sinking fund.

Mr. Ford's average annual payment of interest on account of the Wilson Dam (\$952,000) would be 3.81 per cent on the estimated cost of its completion (\$25,000,000); 2.28 per cent on the estimated actual expenditure for the completed dam (\$41,760,000), and 2 per cent on the total cost plus interest during construction (\$47,724,150).

His average payment of interest on account of Dam No. 3 (\$974,000) is 3.90 per cent of the estimated cost of the dam (\$25,000,000); 3.57 per cent on the estimated cost of the dam, land, and flowage rights (\$27,331,000); and 3.34 per cent on the estimated actual cost including interest during the construction (\$29,190,000).

With interest at 4 per cent the interest paid by the Government would exceed the interest received

for Wilson Dam	\$94,742,000
Dam No. 3	18,699,000
Total	\$113,441,000

Under the plans of the Alabama Power Co., the United States will be required to make no further expenditure. The company will take over the Wilson Dam as it now stands and complete and operate it under the Federal Water Power Act. It will purchase for \$5,000,000 the steam plants and transmission line which cost the Government the following amounts:

5,000 KVA power plant at plant No. 1	\$ 1,272,000
60,000 KVA power plant at plant No. 2	12,326,000
33,300 KVA power plant at Warrior	3,417,000
88M 110,000 Transmission line and	
two substations	1,512,000
Total	\$18,528,000

Under this agreement the Government would still own the two nitrate plants and the quarry.

Power Possibilities

The following computations, which are based on stream-flow records obtained from 1898 to 1920, assume an efficiency of 90 per cent, and a head of 95 feet for the Wilson Dam and of 40 feet for proposed Dam No. 3.

Wilson Dam

H. P. in lowest month	74,600
H. P. available 90 per cent of time	123,000

H. P. by months

	Secondary	Total
12 mo.	0	74,600
11 mo.	51,700	126,300
10 mo.	88,900	163,500
9 mo.	127,400	202,000
8 mo.	175,400	250,000
7 mo.	224,400	299,000
6 mo.	293,400	368,000

Proposed Dam No. 3

H. P. lowest month	31,400
H. P. 90 per cent of time	52,000

H. P. by months

	Secondary	Total
12 mo.	0	31,400
11 mo.	22,300	53,700
10 mo.	38,100	69,500
9 mo.	54,600	86,000
8 mo.	75,600	107,000
7 mo.	97,600	129,000
6 mo.	128,600	160,000

Total for both developments

H. P. in lowest month	106,000
H. P. 90 per cent of the time	175,000

H. P. by months

	Secondary	Total
12 mo.	0	106,000
11 mo.	74,000	180,000
10 mo.	127,000	233,000
9 mo.	182,000	288,000
8 mo.	251,000	357,000
7 mo.	322,000	428,000
6 mo.	422,000	528,000

Under the Ford plan both plants will be installed to full capacity. Of the power thus developed about 100,000 horsepower will be used at nitrate plant No. 2 for making fertilizer or fertilizer compounds; the remainder (130,000 H. P. steam and 750,000 hydroelectric) will be used by Mr. Ford or otherwise disposed of.

The total installation of water wheels in 192 plants located in an area having a radius of 300 miles from Muscle Shoals is only 1,132,000 H. P. compared with the proposed installation of 850,000 H. P. at the Shoals. Of the total installation at such plants only 175,000 H. P. is now used directly in manufacturing. This gives one an idea of the magnitude of the power proposition.

Under the Alabama Power Co.'s plan only the Wilson Dam will be completed at the present time and of the power generated the second 100,000 horsepower will be furnished to the Government free for use in making nitrates or for any other use, and the remainder will be disposed of by the Alabama Power Co. Under such an agreement there would be available for distribution to public utilities by the Alabama Power Co. nearly 100,000 horsepower of continuous hydroelectric power and 270,000 additional horsepower for six months of the year, not including

130,000 horsepower of steam power, part of which is now being used by the Alabama Power Co. under lease.

General Advantage of the Two Plants to the Public

If the offer of the Alabama Power Co. is accepted cheap power would be available at all points now connected with the transmission system of the Alabama Power Co. or embraced within its territory. As the rates are under public control it is reasonable to assume in view of the small cost of power that they would be comparatively low.

It is possible that the Government might at some time utilize the nitrate plants to make nitrates or other ingredients of fertilizers. If it does this the cost of the product should be low, in view of the fact that the Government will have at its disposal 100,000 horsepower at no cost for an average of more than nine months each year.

The mind can run riot over the possible advantages to the public under Mr. Ford's scheme. The only definite thing he proposes, however, is that he will utilize Plant No. 2 to produce annually 110,000 tons of ammonium nitrate or other fertilizer compounds, for which his profits on the actual cost of production will not exceed 8 per cent, and that he will determine whether, by any method, higher-grade fertilizer can be produced there at a lower cost than that now being paid by our farmers.

The quantity of fertilizer used in the United States has ranged from about 6,000,000 tons in 1912 to 7,000,000 tons in 1919. The nitrogen equivalent of the figure for 1919 is approximately 187,000 tons, which may be compared with the 39,000 tons of nitrogen that could be manufactured at Nitrate Plant No. 2; in other words, the benefit, if any, to the farmer from the operation will be due to a reduction in the price of fertilizer. Mr. Ford has not informed the public what this reduction would be, but the prices would probably be lower. Nor has he informed the public what he intends to do with the enormous amount of power that will be available after the demands of the fertilizer plant are satisfied. He will have at his disposal an immense amount of power, the cost of which should be lower than that available anywhere else in the United States, and that fact would doubtless lead to some sort of large engineering or chemical development, with all its interesting technical possibilities.

Openly opposed to the Ford plan are the National Fertilizers Association, certain public-utility groups, and some representatives of large interests. In favor of the Ford plan are the farmers and allied groups, public improvement associations of the South, and in general all those who believe that Mr. Ford possesses the magic touch. Those who believe they will be injured by the Ford plan are opposed to it, those who believe they will be benefited are naturally for it.

(Continued on page 105)

THE BROAD STREET VIADUCT

By J. D. TULLER, '09

Superintendent of Construction with L. J. Sieling Construction Co.

A clear, comprehensive discussion of the methods used and problems encountered in the construction of the viaduct, across the Bronx River, connecting Mount Vernon and Yonkers, New York

THE BROAD STREET VIADUCT connecting the cities of Mount Vernon and Yonkers, New York, is a six span reinforced concrete structure crossing the Bronx River Parkway, the Bronx River, and the tracks of the Harlem Division of the New York Central Railroad. It crosses the Parkway near the northern boundary of Mount Vernon about half way between the stations of Mount Vernon and Bronxville on the New York Central Railroad, at a point which is especially attractive on account of the large trees and other natural features that abound there. It was originally planned, in 1907 as a grade crossing elimination project, of which the City of Mount Vernon, the City of Yonkers, the State of New York and the New York Central Railroad Company were to share the cost. The steel structure planned under the foregoing program did not meet the approval of the Parkway authorities. From the Parkway standpoint the structure was unsightly and inappropriate. They therefore proposed that a bridge of a more permanent character and a finer appearance be built, urging that the increased cost was justified, not only on account of the better appearance, but because of the greatly reduced maintenance charges over those which would have been necessary for the steel structure with a wooden floor as proposed. The Parkway authorities also called attention to the inadequacy of the latter to take care of modern heavy motor truck traffic. They agreed to bear a small proportion of the expense in case a permanent concrete structure were built and also to supervise construction. The negotiations that were carried on as a result of this proposal were extended and covered quite a period of time. An agreement was at last entered into on August 10, 1915, providing for the construction of the reinforced concrete viaduct as eventually built with a few modifications, and outlining the method of payment. The New York Central Railroad Company and the State of New York were to pay the same amounts which they would have had to pay under the original plan,—\$13,652.43 for the Railroad Company and \$6,826.22 for the State of New York. The Cities of Mount Vernon and Yonkers were to pay the remainder of the expense except the small portion (5.7%) born by the Bronx River Parkway Commission.

Mr. Guy Vroman of Mount Vernon, New York,

was retained to design the structure and later supervised the construction. His design called for a viaduct with two spans of eighty-five feet, three of ninety feet and one of ninety-four feet. In addition there were retaining walls at each end which made the total length of the structure seven hundred and fifty-one feet. Before construction was completed Mount Vernon and Yonkers made extensions at their respective ends which made the total length eight hundred and ten feet.

Details of Viaduct

The viaduct is built on a curve which adds considerably to its appearance and at the same time adapts it to the topography of the approaches. The arch rings are solid, and reinforced top and bottom with one inch round deformed bars. A feature of the design is the structural steel cross frames to which the reinforcing steel was bolted top and bottom by hook bolts. Seven of these frames were used over each arch. The spandrel walls have a gravity section. The sidewalk is supported upon brackets cantilevered out from the spandrel walls. The reinforcing in these brackets extends down into the arch ring. At the outside of the side walk is a balustrade of handsome design which adds appreciably to the appearance of the completed bridge. There is a bituminous pavement upon a concrete base.

The total cost of the viaduct as finally built, excepting the two extensions built by Mount Vernon and Yonkers respectively, was \$198,664.19. This includes engineering and incidental expense. The firm of Hoppin & Koen, Architects, assisted Mr. Vroman in designing the ornamental details. I might say parenthetically that I believe the matter of appearance is important in a bridge or other engineering structure that daily comes into the view of many people. I also believe a proper appearance can be achieved without appreciably increasing the cost, especially if the means used are correct proportions and simple lines, rather than embellishments and ornamentations.

Previous Construction

After the design was finally approved and the many preliminaries incidental to an undertaking in which so many parties were involved were disposed of, bids were at last advertised for on February 28, 1917. The low bidder was the Crownbar Construction Company of New York City. Its bid was \$92,-

590.00. The contract was later awarded to this company at this price based on the estimated quantities. Work was started on April 23, 1917. By May 31, 1918, this company had concreted the five piers and two abutments, four arch rings starting from the Yonkers or West side and also the spandrel walls and brackets on three and one-half spans and the short retaining walls on the west side.

The plant used consisted of a wooden tower about one hundred and fifty feet high which was used for distributing the concrete. A "Milwaukee" mixer of $\frac{1}{2}$ cubic yard capacity was set up at the foot of the tower and discharged directly into the bucket running in the tower. The aggregate was transported from bins at the west end in small cars running on narrow gauge tracks. East of the railroad tracks a derrick was set up to handle the concrete into place in the abutment.

In May, 1918, the Crownbar Construction Company discontinued work claiming that the parties to the contract had broken the contract by failing to make payments on time. The reason back of this action on the part of the company was that on account of war conditions it was losing money in the execution of the contract; and the failure of some of the parties to make payments as called for in the contract gave the Contractor an excellent opportunity to stop work. By so doing however, it of course suffered an additional loss by reason of the withholding of retained percentage and of payments due. The writer is informed that this company made several propositions to the parties to the contract previous to stopping work; one being to finish the job at cost if the parties would bear one half of the loss up to that time.

This proposition was turned down. The contractor also tried unsuccessfully to obtain aid under the Walters-Kenyon Act. Failing in obtaining any relief the Company at last dismantled its plant, cleaned up the site and abandoned the work. Before doing so however wooden struts of twelve inch timber were placed between the railroad embankment and the top of the pier adjacent to the east arch to transmit the unbalanced thrust to the embankment. The work done by the Crownbar Construction Company was an example of first-class concrete bridge construction and a credit to the contractor and the engineer in charge.

On account of the war conditions the authorities decided not to proceed with the construction for the time being, and the structure was allowed to stand as it was. This was naturally somewhat detrimental as there was an unbalanced thrust against one pier which the wooden struts did not fully provide for. Moreover the freezing of water in expansion joints and weep holes, and other actions of the elements were more injurious than if the bridge were completed.

Bids for Finishing Work

In May, 1919, it was felt that enough progress had been made toward "normalcy" to justify a resumption of the work. Accordingly bids were advertised for but when the time for opening bids arrived none were received. The explanation of the lack of bidders is undoubtedly to be found in the unusual condition which still prevailed as a result of the war. Prices were high, both for labor and material and no one seemed to know whether they would go higher or not.

The authorities were anxious not to allow the viaduct to stand uncompleted over another winter. They, therefore, again advertised for bids on September 8, 1920. This time five bids were received as follows:

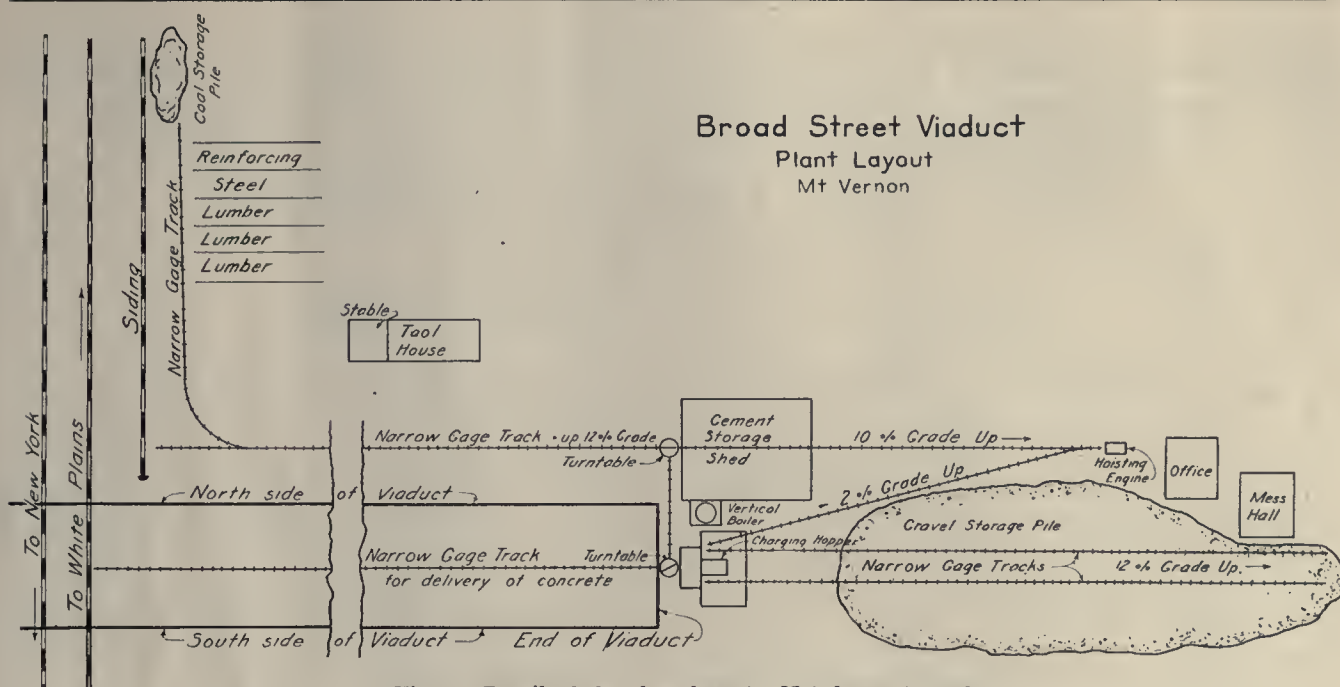
Louis J. Sieling	\$118,368.00
S. S. Jones	133,084.50
F. Nordoni	140,575.50
F. Pecci	153,151.00
S. Smyth	159,460.00

The estimated quantities together with the prices bid on each item by the low bidder were as follows:

80 yds. Earth Excavation.....	\$ 3.00
10 yds. Rock Excavation	10.00
4800 yds. Refill and Embankment	2.00
2700 bbls. Portland Cement	6.00
680 yds. Concrete Class "A".....	25.00
80 yds. Concrete Class "B"	30.00
1150 yds. Concrete Class "C"	32.00
22000 sq. ft. Surface finish by tooling....	.10
9000 sq. ft. Surface finish Granolithic....	.05
7500 lbs. Structural Steel	.12
80000 lbs. Reinforcement	.10
7900 lbs. misc. C. I., W. I. and Steel.....	.12
400' Vitrified pipe	.75
30 yds. Crushed stone and gravel	8.00
Lump sum False Work	18000.00
2450 sq. yds. Waterproofing	1.00
2170 sq. yds. Bituminous Pavement.....	1.00
370 sq. yds. Gravel Pavement	1.00

The contract was awarded on October 6, 1920, to the lowest bidder with the understanding that he was to concrete the two remaining arches at the earliest possible moment,—before Winter if possible. Work was started on November 7, 1920. Plans were immediately prepared for the false work and submitted for approval. They called for 8x8 timber posts with 4x10 caps and sills, two inch arch ribs spaced 12" c. to c. and 1" tongue and groove lagging. In the span over the railroad tracks seven 24" I beams of 80 lbs. section 33 feet long were used to make the opening over the tracks. These were supported on two bents each composed of 7-12"x12" Yellow Pine timbers each 17'-6" long. These timbers were supported on a timber grillage.

About 59,000 feet B. M. of timber was required for this falsework. The first shipment of timber was received November 14, 1920. Work immediately



started on the falsework for the 85 ft. easterly span and was completed December 4, 1920. The concrete was poured in three sections. The first section was poured December 6 and the third section on December 10. The middle section of spandrel wall and the brackets that were a part of this, were poured simultaneously with the central section of the arch ring. Work was started on the falsework of the 94 ft. span over the railroad on December 13, 1920. This was completed on January 3, 1921, without hindering or delaying the heavy traffic on the tracks beneath. Concreting on this arch ring was completed on January 7, 1921.

Plant Layout

In deciding upon a plant lay-out the writer endeavored to get away from expensive and complicated equipment and to use something that would be simple and cause a minimum of trouble. In pursuance of this policy he took advantage of the side hill location as follows: A Ransome mixer on skids with steam engine only was set up on the Mount Vernon side at the extreme easterly end of the bridge in such a location that it would not have to be moved for the entire job. A charging hopper was put in and a platform built at this level. Upon this platform narrow gauge tracks were laid, one on each side of the hopper and continued up the hill for about one hundred feet at the same distance apart.

. For concrete material Hudson River washed sand and gravel mixed in the proper proportions at the gravel plant and known as "Subway Mix" was used. This was delivered by scow at Yonkers and trucked by motor trucks a distance of about six miles. The trucks dumped upon the narrow gauge tracks already mentioned, starting at the foot of the hill and working up. The aggregate was shoveled

by hand into two side dump Koppel Cars of 1 1/3 cu. yd. capacity each. The two cars were connected by a cable running over a pulley block in such a way that when the brake on the loaded car was released the loaded car in descending pulled the empty car up the hill ready for loading. One man rode the loaded cars, walking up the hill as soon as he had helped dump the loaded car.

Cement was received by rail and was unloaded from a siding adjacent to the tracks which run under the bridge.

A narrow gauge track was laid down the hill and extended by means of a small trestle so that a short section of track could be laid inside the freight car containing the cement. A hoisting engine was used to pull the cars up the hill. The track also ran through the cement storage house on its longitudinal axis so that cement could be unloaded on either side of the track with a minimum of labor. At the head of this line of track, farther up the hill and just in front of the hoisting engine, a switch was provided where the cars would run down by gravity to the mixer platform. In operation, cement could be taken out of a freight car and hauled up to the switch and allowed to run down to the mixer platform for immediate use; or it could be hauled up from the freight car and unloaded into storage; or it could be taken from storage and loaded upon a car and hauled up and allowed to run down by gravity to the mixer platform. These three operations or a combination of them could all be carried on by the same hoist, track, and two cars. A spur track branched off from this cement track at the foot of the hill and ran parallel to the railroad siding. It was used for bringing up supplies of coal, lumber or reinforcing steel from the storage piles.

A 40 H. P. vertical boiler was placed between the

cement store house and the mixer. It supplied steam to the mixer and also to a small hoist used to pull the cars of concrete out upon the bridge. It also supplied steam for heating the mixing water and for steaming the concrete under canvas at night when required as a protection from freezing. Two Koppel cars of the same type and size as those used for the aggregate were used to take the concrete from the mixer out to the forms on the bridge. A trestle carried the tracks from the mixer out to the first arch. It was placed upon the center line and was later used to concrete the long retaining walls. After the fill between these walls was made the track was supported on the fill and later extended across the bridge to the Yonkers side. This was used to concrete the pavement foundation and also the side walk and balustrade. For this work a horse was used to pull the cars in place of the hoist formerly employed when the trestle was made use of. This method of distributing the concrete proved very advantageous because concreting was often carried on at various points along the length of the bridge on the same day. A car could be spotted at one point and concrete supplied for the fascia and the next car taken to a point several hundred feet back for the coping and to another point for the sidewalk.

Winter Concreting

As previously stated concreting of the arch ring over the railroad tracks was completed on January 7, 1921. After this, spandrel wall and bracket forms were built and erected. In concreting, advantage was taken of the mild weather that prevailed. Every week or so a day or two of warm weather would come when concreting would be pushed vigorously, all preparations having previously been made. In this way, the spandrel walls, brackets, some of the retaining walls and various other concrete work was advanced during the winter.

Simultaneously the work of casting the 950 balusters was carried on. These balusters were $7\frac{1}{2} \times 9 \times 21$ without reinforcement except small dowels in the base. There was a recess in the top of each to take a dowel in the coping. For this work an enclosure was made under the 85 ft. span before the falsework was taken down. The braces only were removed. This enclosure was heated by means of coal stoves. Forms in units of six were made. In this way thirty-six balusters per day were cast. It was desirable to remove the forms in about eighteen hours but on account of the projections and mouldings on the forms difficulty was at first experienced in doing so without breaking the edges. In order to obtain quicker setting of the concrete the following methods were all used at the same time. The concrete was mixed with hot water, Calcium Chloride was added and, as soon as concreting was completed the space where the forms were was enclosed with canvas. The forms were so arranged that a stove would

come within this enclosure and a temperature of about 85 degrees was maintained for several hours. The following morning forms were removed and the balusters allowed to stand for another day without being moved. They were then stored inside for a couple of days, then rubbed with a carborundum stone and the final finish put on. After that they were stored inside for two more days, then piled out of doors until required.

Backfilling over the arches poured under the preceding contract was also carried on during the winter. For this purpose steam cinders were brought to Yonkers by water in scow load lots and trucked by motor truck to the site. About 5000 cu. yds. of fill were required for this purpose. Removal of the falsework under the two arches also progressed after the concrete was from six to eight weeks old. The removal was accomplished without any particular incident, by backing off the wedges used in erection.

In March, work was started on the erection of the forms for the sidewalk and fascia. The latter was reinforced to the former and poured monolithically with it. The forms were supported from above in order to facilitate removal. This was accomplished by means of 4×10 timbers supported over each bracket on a pipe support consisting of a short length of 2" pipe with a flange top and bottom. Where this pipe support was to be surrounded with concrete it was wrapped with tar paper to permit unscrewing the pipe from the bottom flange, which, of course, was left in the concrete. The forms were supported from the 4×10 timbers by long $\frac{3}{4}$ " bolts. After removal both sets of holes were filled with mortar. The large wooden blocks were for temporary use only and were replaced by the pipe supports as concreting progressed. After the forms were removed, the next operation was the pouring of the small intermediate posts. The balusters were next set in place the same as in stone work, except that the short dowels were placed in the recesses in the fascia after filling them with mortar. The original plan called for pre-cast coping sections, but it was decided to cast the coping in place. Much care was taken in building the forms for this coping and a very good alignment and surface was secured.

Surface Finishing

The contract called for 22,000 sq. ft. of tooling. When the time came to start this it was thought by the engineer that a better appearance would be obtained if the surface were rubbed rather than tooled. Various power machines with which carborundum stone was employed were tried, but as the concrete was about three years old and very hard, this method did not prove successful. The sand blast was next tried. It removed the outside film satisfactorily but carried the board marks back into another plane. It did not seem possible to manipulate the blast in any way to overcome this. Tooling with a

Continued on page 105)

DESIGN OF REINFORCED STEEL CON- CRETE CONTINUOUS GIRDER BRIDGE AT BELOIT, WIS.

By C. S. WHITNEY, M.C.E.'15

Manager of Milwaukee Office, Hool & Johnson, Engineers

An outline of the details which influenced the character of the design,
and of the details of erection

IN THE CITIES and towns about the country are many iron or steel and wooden highway bridges built many years ago which are still in service in spite of the great increase in traffic loads. They are usually placarded with a warning against high speed or heavy loads and are maintained at some expense, but they are nevertheless a menace to public safety. In many cases their replacement has been delayed by the unfavorable condition of recent years. Now that conditions are more favorable for construction work, it should be apparent that the greatest economy can be effected by replacing such a structure with a bridge which would reduce the cost of maintenance and be safe under such heavy loads as may come upon it in spite of warning signs.

The new bridges should be permanent and by reason of their permanence they should be of pleasing appearance. There is no reason why less attention should be given to the appearance of public bridges than to that of public buildings. Certainly a building does not lend itself to artistic treatment more readily than does a bridge spanning a stream of water. The fundamental difference between buildings and bridges lies in the fact that in a building the structural frame is covered over and so hidden from view that it is subordinated while in a bridge it is entirely exposed and is given full expression. The appearance of the bridge depends on the proportioning of its structural frame with only the addition of such ornamental details as moldings and railings.

The nature of reinforced concrete permits such freedom in the selection of type and the detailing of a structure that the development of the design of a concrete bridge is a very interesting problem. A thorough study of the conditions in each particular case is necessary before it is possible to choose correctly between the various possible forms of arches and girders and then special details must usually be worked out to adapt the type selected.

By careful proportioning a skillful designer can secure an artistic effect without materially adding to the total cost. It should be realized that the proper artistic treatment calls for the services of an expert fully as much as the computation of stresses.

In designing a bridge which is economical and artistic, the cooperation of engineer and architect is as advantageous as in the designing of a large building. In fact, closer cooperation is necessary because the structural members themselves must be designed for appearance as well as strength.

In the case of the Shirland Avenue Bridge in Beloit, Wisconsin, the funds available and the location of the bridge did not warrant the spending of any money to give a monumental appearance so an attempt was made to design a bridge which should be as cheap as possible and at the same time of graceful and refined appearance.

The Rock River at Shirland Avenue is about three hundred feet wide with an average depth of about three feet at mean low water. The high water stage is six or seven feet higher and the current is strong, but an examination of the old bridge, a timber trestle carried on timber sills resting on the bed of the stream, showed that the action of ice was not severe. The bed of the river is a shale rock exposed to the current on the west side and sloping slightly down toward the east bank where it is overlain with a few feet of hard gravel.

The roadway is about 12 feet above mean low water at the east bank and slopes up at a four per cent grade to about 24 feet at the west bank. The excellent foundation conditions and height of the roadway suggested two types of construction—filled arches and continuous girders. Careful preliminary estimates showed that an arch bridge would cost for that particular location about 20 per cent more than a continuous girder bridge carried on columns and the latter type was adopted.

In addition to permitting the use of light and graceful girders, the continuous type effects a great saving in material at the piers which on suitable foundations can be constructed of columns carrying transverse girders at the roadway level into which longitudinal girders frame. With simple spans which require an expansion joint at each pier, the structure is not as rigidly tied together and the piers must usually be made solid to provide the necessary stability. Separate columns must be used cautiously where there is any danger of lodging of drift be-

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ALUMNI NOTES

'77 B. C. E., '90 C. E. Theodore L. Mead is in Oviedo, Florida, engaged in the growing of hybrid orchid seed. These are used in experimentation work which is being carried on very successfully. Since Federal quarantine absolutely bars the importation of orchids, seeds will be their only source in the future.

'91. Carleton Greene was elected a director of the American Society of Civil Engineers in 1920, to serve for three years. He is a consulting engineer with offices at 11 Broadway, New York.

'91. William G. Atwood is the director of the committee on marine piling investigations of the National Research Council. His office is in the Engineering Societies Building, 29 West 39th Street, New York City.

'94. Clarence W. Marsh is engaged in consulting, designing, and construction engineering, specializing in that phase of the industry which includes chemical and electrochemical processes. He is now introducing Marsh Electrolytic Cell Batteries in municipalities for chlorine sterilization. Marsh is greatly interested in the practical application of equipment and methods in industries to make them more self contained. His address is Cos Cob, Greenwich, Conn.

'00. William C. Spiker is President of the Atlanta Section of the American Society of Civil Engineers.

'01. Collingwood B. Brown, Jr., Chief Engineer of the Eastern Lines of the Canadian National, has been promoted to Engineering Assistant to the Vice President of that road or system, which comprises all the Canadian Government Railways.

'04. The paper on City Planning in Relation to the Housing Problem presented by Charles M. Repert as part of the Symposium on the National Housing Problem held by the American Society of Civil Engineers is published in the Proceedings of that Society for February, 1922.

'05. Clinton L. Bogert is Principal Assistant Engineer with Alexander Potter at 50 Church Street, New York City.

'06. Edward A. Evans has gone to Mount Holly, N. C., where he is associated with the Catawba Manufacturing and Electric Power Company. He may be addressed in care of the company, Box 55, Mount Holly, N. C.

'07. Thomas H. Olds is Secretary-Treasurer of the Colorado Section of the American Society of Civil Engineers.

'10. John D. Anderson has been elected an Associate Member of the American Society of Civil Engineers.

'08. Richard S. Dodson is Major in the Coast Artillery Corps, U. S. Army, at Fort Mills, P. I.

'10. Clement E. Chase, Principal Assistant Engineer with Modjeski and Angier, Inspecting Civil Engineers of New York, is now located at 818 Widener Building, Philadelphia, Pa.

'11. George S. Frank is Manager of Purchases at Cornell University, Ithaca, N. Y.

'11, '11, '12 MCE. The Chiao Tung University has been organized in China to include the formerly separate Engineering Schools of the Department of Communications of the Chinese Government. The civil engineering branch has been transferred to Tangshan College, Tangshan, North China, and William E. Patten goes to Tangshan as Professor of Hydraulic Engineering. Horace A. Vanderbeek has gone to Wusih, China, to organize a technical high school for the Soochow University. This school, which is backed by the Wusih industrial leaders, will be one of the first of the type in China.

'13. George A. Chase, Jr., now holds the position of manager of the claim department of the Home Friendly Insurance Company, which operates in Maryland and Pennsylvania. He has also been elected to the Board of Directors of this company. His address is 2003 Longwood St., Baltimore, Md.

'13. Captain A. W. Fuchs, of the U. S. Public Health Service has been detailed to make a malarial survey for the Missouri Pacific Railroad, with headquarters at Memphis, Tenn.

'14. Arthur M. Field was a recent visitor at the School. Field is a member of the firm, Hopkins and Field, Consulting Engineers, at 349 Cutler Building, Rochester, N. Y. His home address is 61 Nunda Boulevard, Rochester, N. Y.

'16. James J. Wall, Jr., is representing the Holt Manufacturing Company with offices at 262 Pearl St., Buffalo, N. Y.

'19. Samuel Kaufman is Assistant Engineer of Construction for the United Electric Light and Power Company, 130 E. Fifteenth Street, New York. He lives at 1389 Stebbins Ave.

'19. Nathan November is with the United States Coast and Geodetic Survey as Deck Officer on board the U. S. S. Ranger. He is stationed at San Juan, P. R.

'19. Announcement was recently made of the engagement of Miss Lillian E. Gluck of Milwaukee, Wis., to Robert A. Philipson, 175 Main Street, Ossining, N. Y.

Ex '20. Jacob Selig Cohen-Contin has received permission to change his name to Jacob Selig Contin. His address is 302 Bryant Ave., Ithaca, N. Y.

'20. Announcement has been made of the en-

gement of Miss E. Eloise Shepard, ('20 BS) of Honeoye Falls, N. Y., to Albert O. Degling of E. Orange, N. J. Degling is now with the Robbins-Ripley Company at Rockaway Point, L. I.

'20. The engagement of Miss Nellie B. Bashore to Bernard J. Harrison was recently announced. Harrison, who was a recent visitor at the school, is Sales Engineer for the Van Dorn Iron Works, 318 Broadway, New York.

Ex '20. A. C. Hyer is in charge of a Salinity Survey being made by the U. S. Engineers at Port Arthur, Tex.

'20. Raul Lucchetti is an Assistant Engineer in the Department of the Interior at San Juan, P. R. He lives at the Y. M. C. A.

'21. Kervork B. Bahjajian has been engaged by the J. G. White Management Corporation for appraisals and valuation. His address is 108 Catherine Street, Ithaca.

'21. Samuel D. Brady, Jr., is Chief Engineer for the Brady Coal Corporation, Fairmont, W. Va. He lives at 1201 Fairmont Ave.

'21. John J. Chavanne has been located in Philadelphia since September. He is one of a party of National Board of Fire Underwriters' Engineers inspecting the fire fighting facilities of the Philadelphia suburbs. He reports that he has had to apply quite a few of the points which Professor Seery made a strenuous effort to teach him during his Water Supply course. In April, he expects to be doing the same work in the New York Suburban territory. His headquarters are at 76 William Street New York City. A. C. Hutson '05, is Assistant Chief Engineer and Robert C. Dennett '04 is Office Engineer with the same organization.

'21. Ralph Gray has left the New York State Highway Department and is now with the North Jersey District Water Supply Commission on the construction of the Wanague dam and reservoir. His address is Haskell, N. J.

'21. John L. Guest is a designer in the engineering department of the Southern Power Company, Charlotte, N. C.

CORRECTION

In our March Issue we published an article on the Chippewa Canal by Mr. Burpee in which it was stated that the gradient of the canal was 9 in 1000. Since then we have received a letter from him stating that this should have read 21 in 1000. He also stated that the capacity of the forebay is one-third of the remainder of the canal proper, counting the Chippewa Creek Section. The entire cost of the project was nearly \$100,000,000 and that the prewar estimate was estimated as \$30,000,000.

THE BROAD STREET VIADUCT

(Continued from page 102)

pneumatic chipping hammer was then resorted to with very satisfactory results. Compressed air was supplied by a small gasoline driven air compressor which was moved along on top of the bridge as the

work progressed. The tool found to give the best results considered from all standpoints was a cross (+). The surface of the spandrel walls and the recessed portions of the retaining walls were treated in this way giving a pleasing contrast.

The waterproofing, instead of being applied to the back of the arches, was placed on the concrete foundation for the pavement. Three layers of tar and felt were used. These were turned up at the junction with spandrel walls. A 2" layer of protection concrete was placed upon the waterproofing and the bituminous pavement on top of this.

Two large brackets protrude from the upper portion of one of the piers and have heavy structural steel reinforcing. They are intended for a future stairway connection to the new station to be built by the railroad company within a year. There will be two stairways, one for the north bound and one for the south bound tracks. It is expected that the construction of this viaduct and the railroad station will result in the entire neighborhood, which is sparsely settled at present, being built up. The Parkway Commission is at present working on the drive which will later be continuous from New York City to Valhalla. This drive passes directly under one of the spans of the viaduct. It is expected that this drive will carry a very large pleasure traffic after the completion of the Parkway.

In closing a few words must be said concerning the extremely pleasant and cordial relations that existed between all parties during the writer's connection with the project. It is not unusual for friction to be present when so many parties are concerned in one undertaking. In this case the exact opposite was the rule. The engineer was extremely fair and just. He worked hard to obtain a structure he could be proud of and the results speak for themselves. The Bronx Parkway Commission as represented by Mr. Jay Downer, secretary and Mr. L. E. Holleran, principal assistant engineer, supervised the construction in a general way. Much credit is due these gentlemen. The actions of the various officials of Mt. Vernon and Yonkers and the railroad company were always helpful, and no spirit of destructive criticism was ever shown.

THE SITUATION AT MUSCLE SHOALS

(Continued from page 98)

With only the facts thus presented at our disposal I am inclined to believe that a cold-blooded analysis and comparison of the two propositions is impossible. In closing I wish to quote from a poem by Berton Braley in Leslie's.

"The practical man sees a practical world,

And runs it in a practical style.

He's safe and he's sane as an every day guide;

But still, every once in a while,

Though practical people make living run smooth,

Let's yield to the magical thrall

Of dreamers, whose beautiful visions supply

The reasons for living at all."



SCHOOL NOTES

C. E. ASSOCIATION MEETING

The first regular meeting of the term of the C. E. Association was held on Wednesday, March eighth, in what is now the Sibley recreation room, and once was the habitation of the now defunct Sibley Dog. The meeting was opened by Tran, who acted as temporary chairman, owing to the graduation of the president, Tom Finn. The first business of the evening was the election of a president. Jim Hannigan, '22, was elected to this position. This necessitated the election of a Secretary as Hannigan had formerly been secretary of the Association. Al Lucas, '22, was elected to this position. The graduation of Tom Finn also left a vacancy on the Honor Committee, and "Turk" Brayman, '22, was elected unanimously to this position.

The first business brought before the meeting was the question of a slight revision in the new Constitution, such revision being required under the ruling of the A. S. C. E. of which organization the Association is a Student Chapter. Membership cards of the A. S. C. E. were also passed out at the meeting to those entitled to them.

The principal speaker of the evening was Professor Ogden who proposed that hereafter the professors be not called on to address the Association at the regular meetings, but that short speeches on en-

gineering topics of current interest be made by members of the Senior Class. The talk Professor Ogden gave was very interesting and his idea took well. It is expected that at the next meeting his plan will be tried out.

The entertainment of the evening was provided by Barreto and his seven piece orchestra, by Spurney with one of his poetic recitals, and by Schoonmaker who gave a very good imitation of the late Bert Williams, the comedian. The meeting closed with doughnuts and coffee for all, thanks to the assistance of "Archie" Heath to the entertainment committee.

C. E. CREW

More men are needed for the C. E. Crew. Register now at the Old Armory or call up Bear, 2544. Don't get the idea that you have to be a giant to be a good crew man. If you weigh 150 and have a fairly good development of the body get into crew togs and train with the C. E. Crew. The intercollegiate races will be held on Spring Day. Every day of training counts. Get busy. Let's see if we can't add another trophy to those already in the library.

WATER ON THE BRAIN!

Water Supply, a senior course whose nickname is 230, is the cause of this. Professor Seery, in his announcement to the class at its first meeting for the term strongly emphasized the need of working a little each night on water supply reports. He tried to discourage the students from letting it all go to the last minute. He pointed out the danger, both physical and mental of sitting up all night in an attempt to crowd a month's work into a few hours. "But there is a particular danger in doing this in water supply," he said, "in trying to cram four weeks' work in water supply into one night you're very apt to get water on the brain."

WHO'S WHO IN THE COLLEGE

JAMES HANNIGAN

President C. E. Association

James Hannigan first entered Cornell in 1917. He prepared for college at the Wyoming Seminary at Kingston, Pa. He comes, however, from a place



called Forty Fort, a small town about forty miles east of Kingston. When the United States entered the World War, Jim enlisted in the engineers and served for thirteen months, twelve of which were spent overseas. He was a member of the 116th Engineers, and of the 509th Engineers, which was commanded by W. B. Freeman, '05. After the armistice was signed Jim was sent to

University College, University of London, England, for the Spring Term as a member of the Student Detachment, A.E.F. After being there one term he was returned to this country and was discharged in time for him to return to Cornell in the fall of 1919. At different times Jim has been a member of the Cross Country and Soccer Teams of the School, and has been on the Basketball and Baseball Squads. He is a member of the British-American Club and the Cross Country Club. The first term of this year he was Secretary of the C. E. Association, and when Tom Finn was graduated, Jim was elected President. He is also a member of the College Honor Committee. He was elected member of Tau Beta Pi, Honorary Scholastic Fraternity at the beginning of his Senior Year.

ROSS STOCKBRIDGE ANDERSON

Vice President C. E. Association

Ross Anderson first came to Cornell in 1918, as a graduate of the McKinley High School of Washington, D. C., and is a member of the Delta Kappa Epsilon Fraternity.

His qualities were early recognized, for in his Fresh year he was made a member of the Freshman Banquet Committee and in his second year a member of the Sophomore Cotillion Committee. His success as a committeeman in these two positions was recognized so that in his Junior year he was made a member of the Junior Prom Committee and this year a



Photo by White

member of the Senior Ball Committee. In his Sophomore year he became a lowly competitor in the Masque. He won his competition and was elected Assistant Manager of the Masque for the following year, and he is Manager this year. Because of his prominence he has been elected to Sphinx Head and to Pyramid. He has served as a member of the Freshman Advisory Committee for two years. Last year he was elected Athletic Director of the C. E. Association, and this year Vice-President. He is also a member of the British-American Club. In spite of all these activities he has had a phenomenal scholarship record for he was elected to Tau Beta Pi the first half of his Junior Year.

THE HONOR ROLL OF C. E.

as announced by the faculty in charge of the Convocation for the honoring of Scholarship.

CLASS OF 1922

Samuel Burns	Charles Ward Gulick
Harold Stone Woodward	Frank Ellsworth Conkling, jr.
Shen Chu Chao	Carleton Elliott Bryant, jr.
Frank Garland Trau	Charles Wilson Carpenter
Abraham Josefson	Charles Edward Rauh

CLASS OF 1923

Burton Aleott Scott	Dwight Lathrop Copeland
Earle Nims Scott	Ernest Waldo Downs
Austin Lyman Rumsey	Felix Emil Spurney
Michael William Hourigan	Charles Douglas Palmer
Benjamin Henry Palmer	Harlan Page Bosworth

CLASS OF 1924

Salvador Joseph Cianciulli	Paul Fred Beaver
Joseph Anthony Rooney	Dorothy Wilson Allison
	Claude Lewis Brownell

SPECIAL EXTRA

C. E. WON the intercollegiate indoor track meet held Saturday, March 19th in the old armory, scoring in every event but one, and winning by a lead of five points over the nearest competitor, M. E. At the time of going to press full details are lacking, but it is rumored that Bill Van Pelt was the Star of the meet, pulling down a first and two seconds for us.

THE PENN STATE TRACK MEET

As usual the sons of Lincoln Hall were well represented at the Penn State-Cornell track meet held in the New Armory on Saturday, March 4. And the undergraduates did not provide all the representation either. This time, the faculty stepped up for its just share of the honor. It is with a feeling of pride that we say that the C. E. faculty had more of its professors acting as officials than any other college in the university. Professor L. C. Urquhart of the Bridge Department and Professor H. H. Seofield of the Materials Department were two of the five inspectors at the meet. Professor Carl Crandall of the Railroads Department and Professor L. A. Lawrence of the Surveying Department were the timers. One of the judges at the finish was T. L. Colburn, instructor in Bridge Engineering. Professor Seofield was also judge at the Broad Jump. Besides this "Duke" MacBean, '23, Manager of Scholastic Track was one of the scorers. But this is not all.

Fred Lovejoy, C.E. '24, won first prize in the 75-yard dash and ran a wonderful quarter mile as his part of the one mile relay. Ed Kirby, another Sophomore C. E., captured second place in the mile run and was beaten by no one less than Shields, last year's intercollegiate champion. Kirby and Shields drew away from the rest of the field early in the race and fought it out together. Shields won by a scant three yards. Shields broke the record for the Armory track by running the mile in the fast time of 4 min. 21 3-5 sec.

The Major Sports Council recently announced numerals for the Class of 1924, which were deferred from last year. Ed Kirby and C. M. MacWilliam, both C. E. Sophomores, were awarded their numerals for excellence in track last year.

We realize that the alumni know who won the Penn State meet when they remember that Jack Moakley is still on the job. Incidentally, the score was 73½ to 30½ in favor of Cornell.

THE FUERTES MEMORIAL PRIZES

Once more the annual competition for the Fuertes Memorial Prizes in Public Speaking has been announced. Final speeches will be made on the twenty-first of April, but preliminary trials will be held on the thirteenth of April, the day after the end of the Spring Recess.

In the last few years the C. E. Men have not held their place in the Speaking Contests with the Men from the other Engineering Schools and the College of Architecture. Two years ago a student in M. E. won first place, with E. F. O'Brien of C. E. second. Last year men from Architecture carried off both first and second places. C. E. had but one man entered in the contest and he failed to place, third place going to an M. E. man.

The only requirements in regard to the speech

are that it must be argumentative in character, must be of a technical nature and must be delivered in not longer than fifteen minutes. Delivery must be made without notes, but illustrative material such as diagrams, models or lantern slides may be used if desired.

The three prizes mentioned above are \$125, \$35, and \$20 respectively, and represent the income from a fund established by Charles H. Baker, C. E. '86, in honor of the former Director of the College, Estevan A. Fuertes, who was Dean of the Faculty of Civil Engineering at the time Mr. Baker attended the University.

In the School there are several men, in both the Junior and Senior Classes, who have the ability to enter a contest of this character. It is up to you men to get out and get to work. On the whole the school has fallen far below its old standard in inter-college activities in the past few years. Work, and plenty of it, is the only thing which will help us to regain our prestige. Here's a chance to make a start on the upward path.

"BARRIE" BARRETO '22

B. F. C. A. deBarros-Barreto, C. E. '22, late of Brazil and now a full-blooded Ithacian was recently elected Captain of the Cornell Fencing Team. At the beginning of the season "Barrie" was temporarily chosen captain of the team by Coach Major Edgerly on account of his splendid work with the foils. His recent election to the leadership of the team comes as a result of this proficiency.

"Barrie" is in his last term at Cornell and as soon as he gets his C. E. degree intends to go back to Brazil and take up a position with the Brazilian Government Railways.

THE SHIRLAND AVENUE BRIDGE AT BELOIT. WISCONSIN

(Continued from page 103)

tween the columns or the scouring of the foundations, but where those conditions are satisfied, the type offers a very economical solution.

The number and length of spans was determined by a study of the effect of span length and number of expansion joints on the total cost of the structure. The height of the banks made it advisable to extend the end spans some distance beyond the shore line in order to cheapen the abutments. In this way the abutment walls were made light retaining walls. Of course, the nearer the river they came, the higher they would be, so the end of the span was located at that point where the cost per lineal foot of the two side walls and the fill was estimated to be the same as the cost per lineal foot of the river spans.

The bridge is in eight spans with expansion joints at the 1st, 4th, and 7th piers which divide them into single spans at each end and two series of three continuous spans. The expansion joints are formed

(Continued on page 8)

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GET A
SODA
AT THE
FOUNTAIN

BRINGING MORE DAYLIGHT INTO INDUSTRIAL BUILDINGS.

Dr. George M. Price, writing on "The Importance of Light in Factories," in "The Modern Factory," states: "Light is an essential working condition in all industrial establishments, and is also of paramount influence in the preservation of the health of the workers. There is no condition within industrial establishments to which so little attention is given as proper lighting and illumination. Especially is this the case in many of the factories in the United States. A prominent investigator, who had extensive opportunities to make observations of industrial establishments in Europe as well as in America, states: "I have seen so many mills and other works miserably lighted, that bad light is the most conspicuous and general defect of American factory premises."

"My own investigations for the New York State Factory Commission support this view. In these investigations it was found that 36.7% of the laundries inspected, 49.2% of the candy factories, 48.4% of the printing places, 50% of the chemical establishments, were inadequately lighted. There was hardly a trade investigated without finding a large number of inadequately lighted establishments."

Inadequate and defective lighting of industrial buildings is not confined to the establishments in New York State alone. The same conditions prevail in most sections of the country.

Such conditions as mentioned above are entirely opposed to the laws of health, sanitation and efficiency. Wherever poor lighting conditions prevail, there must be a corresponding loss of efficiency and output both in quality and in quantity. American industry is not using nearly enough daylight and sunlight in its buildings. Every endeavor should be made to use as much as possible of daylight for lighting purposes. To obtain this it is of course necessary that the rays of daylight and sunlight are permitted to enter the interior of the buildings as freely as possible, with the important modification that the direct rays of the sun must be properly diffused to prevent glare and eyestrain. A glass especially made for this purpose is known as Factrolite, and is recommended for the windows of industrial plants. Windows should be kept clean if the maximum amount of daylight is to pass through the glass, but the effort will be well repaid by the benefits secured.

In the presence of poor lighting, we cannot expect men to work with the same enthusiasm as when a well lighted working place has been provided. The physical surroundings have a deep effect upon the sentiments of the employes, and where bad working conditions are allowed to prevail, there is invariably a lessening of morale and satisfaction created thereby. Neglecting to utilize what nature has so bounteously provided, daylight, and which is so essential toward industrial efficiency, we have an instance of wastefulness, but now that the importance of good lighting is becoming recognized, undoubtedly more attention will be given by progressive industrial employers to furnishing the means which are essential for their workers to secure and maintain the efficiency, which counts for so much in the success of any industrial concern in this competitive age.

If you are interested in the distribution of light through Factrolite, we will send you a copy of Laboratory Report—"Factrolited."

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Chicago,

THE SHIRLAND AVENUE BRIDGE AT BELOIT, WISCONSIN

(Continued from page 108)

by providing double girders and double columns down to the footings. It was found that there is no appreciable economy in having the girders continuous for more than three spans and the longitudinal expansion and contraction under change of temperature became too great to be taken up by the flexure of the columns without inducing excessive bending stresses. The columns were investigated for stresses produced by lateral forces and temperature changes as well as for vertical loads and it was considered advisable to use spiral reinforcement to increase their toughness.

On account of the relative stiffness of the roadway and the flexibility of the columns, the continuous girders were designed as though resting on hinged supports. Influence lines and maximum moment and shear curves were drawn for live and dead loads. The maximum live load stresses in the longitudinal girders were produced by two twenty-ton trucks placed in the most critical position for each section of the girder.

Strict economy demanded the use of a pipe railing but concrete piers were provided over the columns to give it a more substantial appearance. Cast brass bases and bronze bolts were used for the intermediate iron rail posts to prevent rust from weakening the posts and staining the concrete. The footings were carried down to solid rock. A cofferdam of sheet piling was constructed for each pier and kept unwatered with a small centrifugal pump. The excavation was carried down to rock where there was gravel overlying and the soft rock was stripped off. Forms were constructed for the footings inside of the cofferdams and the water was kept pumped up till the concrete had been placed. This method permitted careful inspection of the foundation and there was no uncertainty as to the quality of the concrete and its bearing on the rock as there would have been if the concrete had been placed through water.

The original intention was to pave the roadway with asphalt but during construction it was decided to lay a 3" brick pavement and the height of the curb was slightly increased.

Concrete lamp poles of crushed white marble and grey cement with fixtures conforming to those used along the adjoining streets are to be placed on the rail piers above the double expansion columns. These poles are being made by the Massey Concrete Products Corporation by the centrifugal process. This process is being used quite extensively for a variety of concrete products and is an interesting development. For the poles, a cast iron mold is used which is split in two parts longitudinally. The reinforcement for the pole is built up and placed in one half of the mold with buttons of mortar wired to it to keep it the proper distance from the surface. The mold is then bolted together and the proper amount of warm concrete to make the hollow pole is poured into the end. The form is sealed and run into a machine which spins it rapidly for a few minutes on a horizontal axis till the concrete is solidified against the mold and a hollow core is left through which the excess water is drained. The mold is placed in a steam tunnel for a few days for curing, at the end of which time the mold is stripped and the surface of the pole is brushed and washed. When properly controlled, this method produces very dense and durable concrete.

The Shirland Avenue bridge was designed in the Milwaukee office of Hool & Johnson for the Public Works Committee of Beloit, Wisconsin, of which Mr. G. E. Heebink, City Engineer, is chairman. The contractor was John Schneiberg of Beloit. The contract price was \$23,990.00 exclusive of the backfill and grading at the abutment and the brick paving.

THE BRIGHT SIDE OF ENGINEERING

A spirited argument was in progress in the architect's shanty located on a building construction job between the designing engineer and the heating contractor. The heating contractor was complaining against the design of one of the trusses which necessitated some complicated bending of the heating conduits on his part. The following was overheard:

Heating contractor: "All right, I'll bend my pipes to suit your damn truss."

Designing Engineer: "It's not a damn truss. It's a blessed truss and it's holding up your damn pipes."



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Monthly publication of the
ASSOCIATION OF CIVIL ENGINEERS
OF CORNELL UNIVERSITY

MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

VOL. XXX, No. 8

MAY, 1922



Where the oil of the future will come from. A view of the oil shale fields typical of Colorado, Wyoming or Utah. See page 116.

What Is the Cornell Civil Engineer Doing?

By G. C. BROWN, C. E. '06



Illustration from "De Re Metallica" by Agricola, published in 1546

Breaking Ground by Fire-setting

The ancients "blasted" by fire-setting—slow, laborious, dangerous, and ineffectual.

Describing Hannibal's crossing the Alps in 218 B. C., Livy says: "The cliff heated by fire was broken by iron tools so that not only the beasts of burden but also the elephants could be led down."

In "De Re Metallica" (1546) Agricola explains the early fire methods in detail—how the sticks were prepared; how these were piled against the face of the rock; how the fire softened or cracked the stone for a certain depth; and how water was sometimes dashed on the heated rock, which was shattered by the sudden and uneven cooling. Even as late as the 17th century, fire setting was practised, and an advance

of 5 feet per month in headings was often considered good.

In May 1921, a contractor drove a total of 942.3 feet in $4\frac{1}{2}' \times 6'$ drifts and crosscuts, using Hercules Dynamite. An average of 11 feet advance was made per machine shift with a dynamite consumption of 8.7 pounds per lineal foot. Explosives have made possible greater results in eight hours than our ancient brethren accomplished in a month.

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MAY, 1922

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A New Field for Engineers, by Carl A. Gould, C. E. '07	116
In this article, Mr. Gould, a Civil Engineer living in Utah, states clearly the possibilities and commercial significance of the western oil shales; and the position the Civil Engineer should occupy in this great industry which may "bloom forth" at any time.	
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and

Transactions of the Association of Civil Engineers of Cornell University

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Member of the Engineering College Magazines Associated

Vol. XXX

MAY, 1922

No. 8

EDITORIALS

THE NEW BOARD

At the annual banquet of The Cornell Civil Engineer Board, the following elections were announced for the 1922-23 Board:

Editor-in-chief—Felix E. Spurney -----Astoria, L. I.
Managing Editor—George J. Oehrlein -----New York City
Alumni Editor—Robert L. Schmidt -----Brooklyn, N. Y.
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HENRY SYLVESTER JACOBY.

This June, Professor Henry Sylvester Jacoby will retire from active teaching, and become Emeritus Professor of Bridge Engineering of Cornell University.

While few of the students in the lower classes have taken work under Professor Jacoby, those of us in the upper classes who have taken, or are taking, work under him, realize and appreciate the wonderful character and ability of the man, and we cannot help but wonder how the blank left by his retirement can possibly be filled.

In a time such as this words are futile to express the feelings of these students; the most we can do is to wish him Godspeed, happiness, pleasure and success in whatever new work he undertakes.

PROFESSOR OGDEN'S SUGGESTION

At a recent meeting of the Association of Civil Engineers of Cornell University, now affiliated with the American Society of Civil Engineers as a student chapter, Professor H. N. Ogden of the Department of Sanitary Engineering, the main speaker of the evening, uttered a few thoughts which merit meditation and discussion. In substance Professor Ogden said that the system now pursued by the Association of having the regular members of the faculty of the School as speakers at its meetings was fundamentally unsound and in variance with the ideals which prompted the formation of the Association. The Association was started as a strictly student affair and as such should be a common ground for the interchange of student ideas. In other words, the place

of student and professor at an Association meeting should be exactly reversed to that which it is in class. The student should provide the talks and entertainment for the professor and the professor should sit back, after a hard day's work and learn from the student.

We are heartily in accord with Professor Ogden's opinion. One reason for the lack of interest in the meetings of the Association in the past came as a result of indifference on the part of students to the program presented. If the students realized that they were responsible for the program at an Association meeting it may be that they would immediately take more interest in the meeting. Student speakers would create more interest in the meetings and consequently, more lively interest in the affairs of the Association.

Professor Ogden is to be commended for not only pointing out a salient weakness of the Association but also for suggesting a simple and definite remedy. The specific procedure recommended by Professor Ogden is as follows: At least a week before each meeting of the Association takes place the president of the Association is to draw by lot the names of three or four seniors who are to speak. These men will prepare short papers or speeches on some phase of civil engineering in which they are interested. The speeches are to range anywhere from five to fifteen minutes in length. At the end of the speeches a general discussion on the papers presented will ensue. After each senior has had an opportunity to present either a paper or a speech, the Association shall present a cup, medal or other suitable trophy to the best speaker of the senior class.

The very definiteness and simplicity of this scheme are its cardinal virtues. The training which the men will receive in speaking and thinking on their feet will be invaluable. There are a number of civil engineering students (and alas, graduates too) who are very poor speakers and who know they are deficient in the power of expressing themselves clearly and forcibly. Yet, rather than try to overcome this deficiency they attempt to hide it and

treat it as a matter of no consequence. Many students dread taking the required course in public speaking on this account. But it is just the thing they need most. When these students are called upon to recite in class they usually make a mess of their reply, become hopelessly confused and are glad when the next man is called on. To such as these Professor Ogden's scheme of conducting the Association meetings would be a hard pill to swallow; but, later in life, they would look back upon the training received from it as a perfect boon to their professional success. However, in order to prove successful, the new scheme must have the hearty support of the students. No man must refuse to speak when he is notified by the president of the Association that he will be called on at the next meeting. Like a true Cornellian, he must give a little of his time and effort toward instilling life into the Association and make it a little better organization for his membership in it. Professor Ogden's scheme would enliven interest in the affairs of the Association and should be adopted immediately.

THE CIVIL ENGINEERING MUSEUM

It is high time that something definite were done towards making the civil engineering museum of more use and of more accessibility to students in the School. The condition which the museum is in today belies its name. It is not a museum, it is a disorderly collection of apparatus and instruments arranged in no semblance of order and with no attempt at artistic or skillful display. Not once have we seen anybody inside the glass encased compartments of the museum. Only a few (and they are mostly freshmen who enter the room for surveying instruments) take the trouble to peer through the glass case at objects which are covered with dust. Even they are unrewarded for their trouble because there are no name plates on the various displays which might inform the curious as to just what they are viewing.

More is the pity, and the loss, that the museum is not available for student observation and inspection when it is just full of important models, apparatus and instruments of interest to a civil engineer and his profession. Some of the objects have an interest from a historical viewpoint, others of a practical nature. But they are all interesting and should be displayed in a manner more in keeping with the purpose for which a museum is established. In order to arouse the students' curiosity as to just what the museum contains so that he can become interested and help create a sentiment toward the opening and improving of the museum we quote from page 16 of the Announcement of the College of Engineering, 1921-22:

"The Museums of the School of Civil Engineering contain the following collections: (1) The Muret collection of models in descriptive geometry and stone cutting. (2) The DeLagrange general and special models in topography

and geology. (3) The Schroeder models in descriptive geometry and stereotomy with over 50 brass and silk transformable models made in the School after the Olivier models. (4) The M. Grund collection of bridge and roof details, trusses and masonry structures such as right, oblique and annular arches and domes, and several intricate models in stone cutting, supplemented by similar models by Schroeder and other makers. (6) The Digeon collection of movable dams, artificial harbors, and working models in hydraulic engineering. (7) Working models of water wheels, turbines, and other water engines. (8) Several large collections of European and American progress photographs of engineering work showing the progress of construction and many other photographs, blue prints, models and diagrams. (9) A collection of typical geodetic and surveying instruments of historical interest, including a secondary base-line apparatus made under the direction of the United States Coast and Geodetic Survey, a pair of base-bars constructed in this School, solar and magnetic compasses, levels, transit, etc. with a large number of special instruments such as planimeters, pantographs, elliptographs, calculating devices and computing machines".

This is indeed a wealth of material and of character which the School ought to be proud to display. No one would imagine that all these priceless models and interesting apparatus and equipment were represented by the objects in the museum today. Some action should be taken toward making our museum a real museum, improving the displays and throwing it open for student use and inspection. We suggest that the Faculty of the School take the initiative and appoint a committee or a single professor (as is done in the case of the library) to take charge of the museum. And incidentally, if improvements are to be made, the lighting system ought to be investigated and improved. At present it is very ineffective.

ALUMNI, ATTENTION!

At the present time the work of compiling the material for this year's directory of Graduates of the College is well under way. During the past year cards have been sent to practically every Alumnus, and the great majority of these have been filled out and returned.

There are a few who have failed to return the cards. We ask you here and now to please get the cards out and let us have them at once. There are a few whose cards have been returned to us by the Post-Office Department stamped "Removed-Address Unknown". If you know of any C. E. men who have not received cards it may be that they are in this last class. Ask them if they have received cards, and if they have not please let us know, or tell them to let us know.

Oftentimes in the past we have been able to get track of a man whom we have lost track of through the use of the space marked "News of Other Alumni" on the bottom of the card. Therefore when you fill out your card do not forget the bottom space. It has a definite value, and is there for a purpose.

If you change your address or your position, do not wait for a card to reach you because sometimes it does not. Let us know at once so that we can get the change in the Alumni Notes, and in our files.

The Cornell Civil Engineer: Where He Is and What He Is Doing

A review of the work of Cornell men, embracing the past fifty years, with statistics showing their geographical distribution at the present time

By G. C. BROWN,
C. E. '06, M. C. E. '09, M. A. S. C. E., A. A. E., Cor. Soc. C. E.

IN 1921 the College of Civil Engineering of Cornell University celebrated the fiftieth anniversary of its first graduating class. During those fifty years more than two thousand civil engineers have gone forth from their Alma Mater to seek their fortunes in the battle of life. How they have succeeded is a story full of interest. The last June issue of the CORNELL CIVIL ENGINEER is an encyclopedia of information where we can find this story written in full. It is a directory, prepared with infinite care and much labor, giving for every living graduate his class, the degree received his present occupation, business address, and society affiliations.

It is doubtful whether many readers realize the amount of work necessary to compile this directory, and the majority do not delve deeper into it than to seek out a few notes concerning the occupations and whereabouts of their college chums and intimate friends. The purpose of this article, therefore, is to sort and arrange this information for the benefit of all. For Cornell civil engineers this will constitute a personal narrative, and to them will be of paramount interest. Since Cornell, however, is one of the largest and foremost universities, the history of its graduates will be similar to the history of graduates from other institutions and hence will be representative of all groups of civil engineers and of the profession in general.

Number of Graduates

As already stated, the 1921 directory has been chosen for this study, thus bringing the subject up to the present and covering the full period of fifty years since the first class of civil engineers was sent out from Cornell. During that time 2108 degrees of Civil Engineer and 116 degrees of Master of Civil Engineering have been granted by that College. These were granted to 2155 graduates of whom 1982 are still living, and their names are to be found in the directory. This is a ratio of a little more than nine out of every ten, and is indeed a fine showing.

Plate I shows these figures graphically. It gives for each class the total number of graduates and the number of names now listed in the directory. Also the ratio of total graduates to total now living is given by the ratio curve.

The chart shows the gradual but slow increase in size of classes during the years 1871 to 1904. Engineering seems then to have experienced a sudden in-

crease in popularity and the classes grew rapidly until a maximum was reached in 1912. Beginning with the year 1914, the World War shows its damaging effect on the size of classes, and in 1918 a new minimum was reached. The number is now gradually increasing again and will probably soon reach another high mark if restrictions are not imposed. The chart marks clearly the periods of depression and prosperity in the country. If one is familiar with current history he can see reflected in the ups and downs of the chart every variation from the average good business condition.

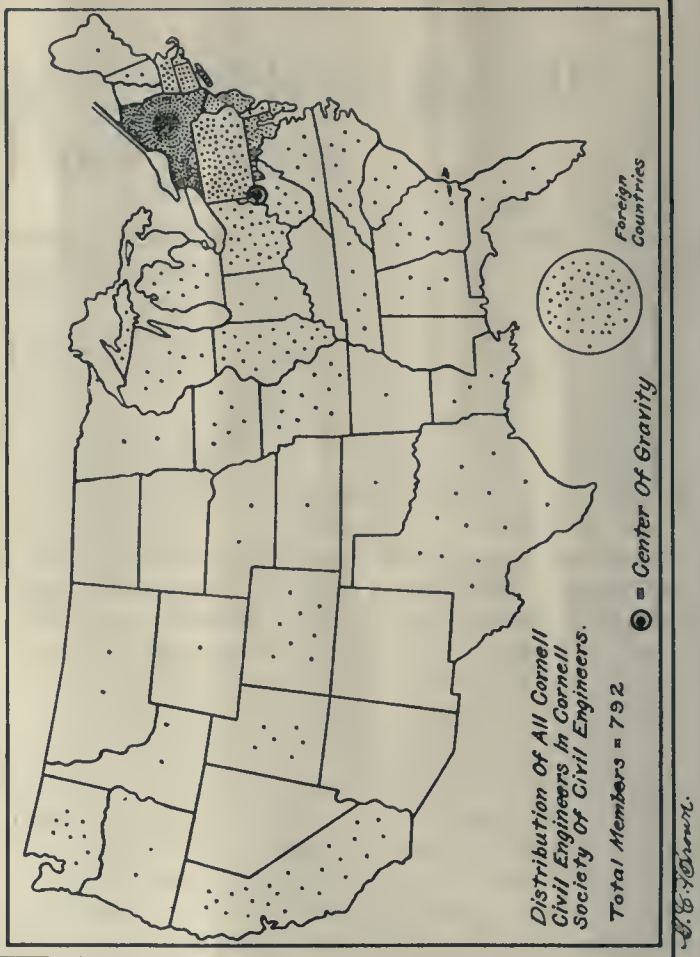
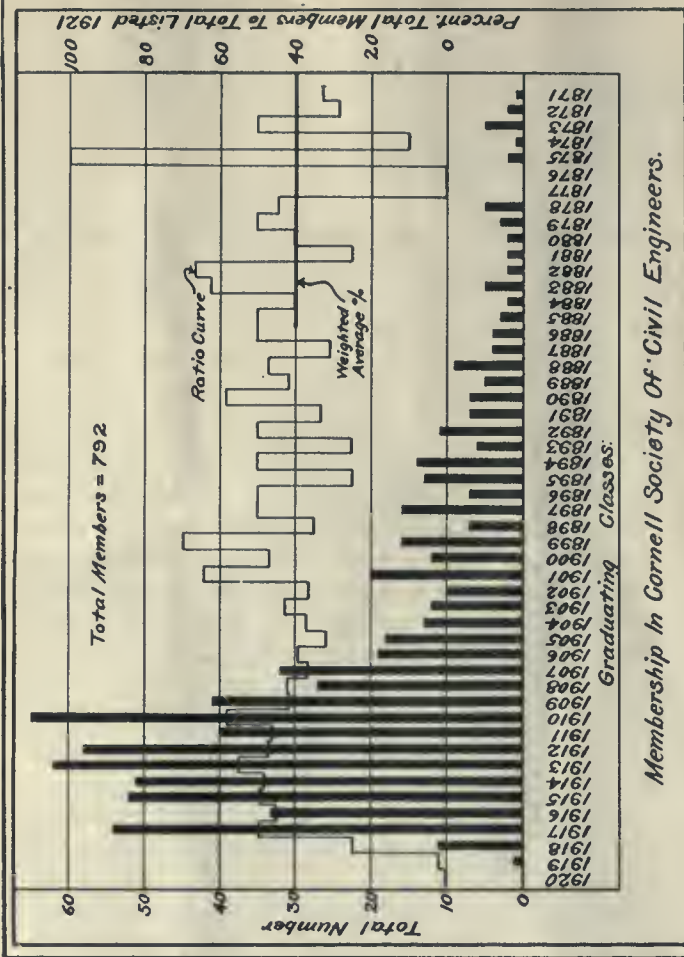
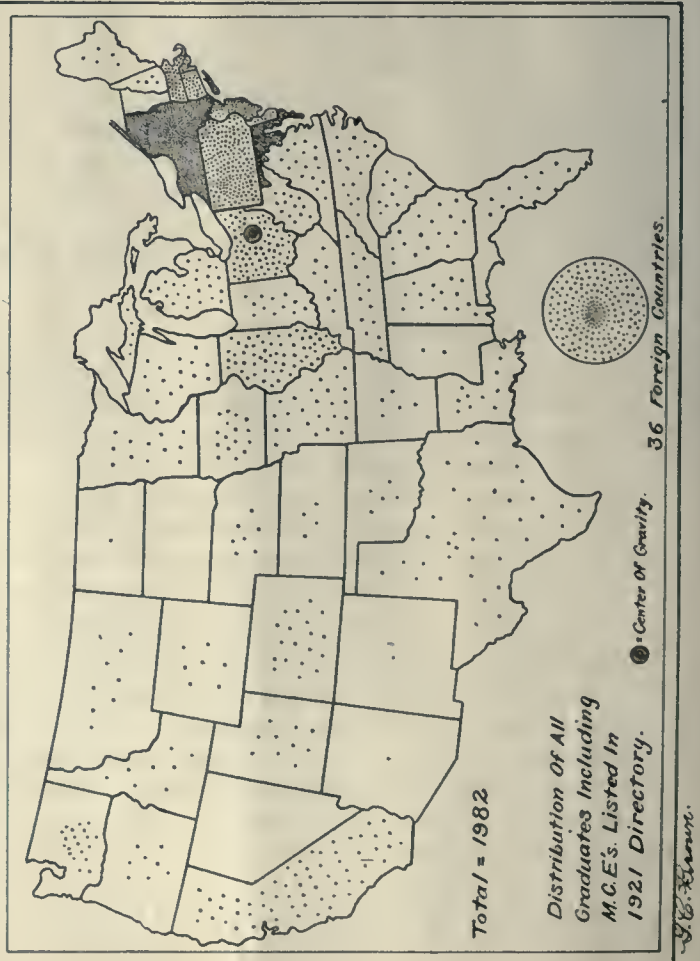
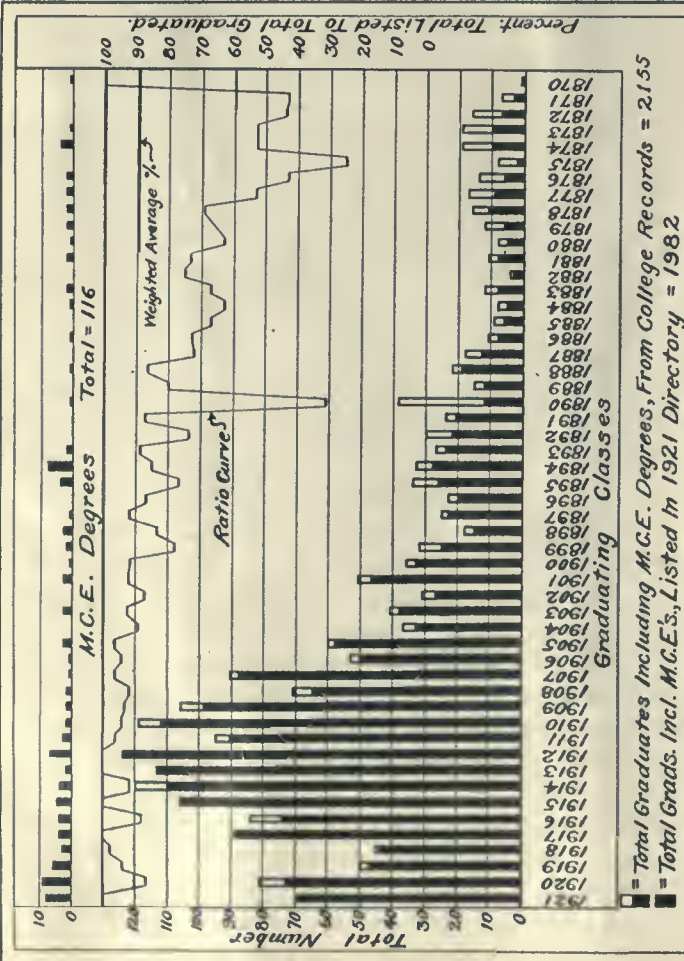
It is natural to find the ratio of total graduates to number now living much smaller for the early classes than for the later and much larger classes. It will be observed that in the early years this ratio runs from 40 to 70% while for more recent classes it lies between 90 and 100%. The class of 1890 shows the lowest ratio of all except 1875. It would be interesting to know what misfortune has befallen that class, that it should be depleted so much more than all others.

The first class of civil engineers was graduated in 1871. The one graduate shown in the chart for 1870 received the degree of Master of Civil Engineering. We are reminded by a letter from Professor Barnes that Professor Eddy, the holder of that first advanced degree, died during the last year.

The M. C. E. degrees shown at the top of the chart correspond to the total number of advanced degrees given in the various classes. They make a grand total of 116 Master Degrees, or one for every 19 graduates.

Geographical Distribution

The lower half of Plate I shows the geographical distribution of all Cornell civil engineers in the United States. This chart tells an interesting story. The graduates are scattered over the Country from Maine to California and from Washington to Florida, with only a few exceptions here and there. The three states, Nevada, South Dakota and Vermont claim no graduates and Arizona, New Mexico and North Dakota have only one each. While at first glance the distribution does not seem to be even, a closer observation discloses the fact that it is almost directly proportional to the total population as shown by the 1920 government census. Where the total population is great there the civil engineers are to



be found in greatest numbers. This is natural for the greatest amount of work for engineers is to be found in the largest centers of population.

It might be natural to consider that the majority of graduates would find permanent locations within a circle of comparatively short radius from the school from which they were graduated. Such a theory might be advanced to account for the very dense population shown in New York, Pennsylvania, Maryland, and New Jersey. It might be true with regard to a small school, but can hardly be used with much force in the case of a great University. In support of this statement note that the center of gravity of all Cornell civil engineers in the United States lies in the State of Ohio. The 1920 government census showed that the center of gravity of the total population of the country lies in Indiana. It can be seen that the addition of only a few more Cornell men through the middle and far West would make the center of gravity of Cornell Civil Engineers coincide with that of the entire population.

Distribution in Foreign Countries

In making this comparison it should be noted that no account can be taken of the 241 graduates now living in foreign countries. The lower half of Plate IV shows this distribution. It will be seen that 36 countries are occupied outside of the United States. China is best represented with a total of fifty graduates. Next in order come the countries of Canada, Cuba, Philippines, Porto Rico, Hawaii and Brazil, with numbers varying from 29 to 10. The remaining 29 countries have only one, two, three, four or five Cornell men. On an average, one out of every ten men is in a foreign land.

It must be borne in mind that these charts show the distribution of civil engineers in their present occupations. It must not be assumed that the men originally lived in the places where they are now found, and that after graduation from Cornell they returned to those same places. That would probably be true of only a small proportion of the men. Another chart showing their original locations for comparison with the chart given would be extremely interesting. Data are not at hand, however, for the construction of such chart.

Of very great interest also, would be similar charts constructed from records of other large engineering schools in the country. A comparison of several of them would show conclusively whether the graduates tend to group themselves permanently around the school as a center or distribute themselves with respect only to the density of total population. Let us hope that some such charts will soon appear for our edification.

The Cornell Society of Civil Engineers* is not a technical organization but solely an alumni society. Its object is to work for the best interests of the College and the University and to promote the wel-

* Now Cornell Society of Engineers.

fare of the alumni. It aims to establish cooperation and unity of interest among its members by holding regular business meetings and by the occasional publication of information and items of interest. The Society operates an employment bureau which every year gives very valuable service to many Cornellians. In January there is held an annual meeting and banquet at which are discussed all important doings of the University and Society and where plans are made for greater service during the new year.

Membership in Cornell Society

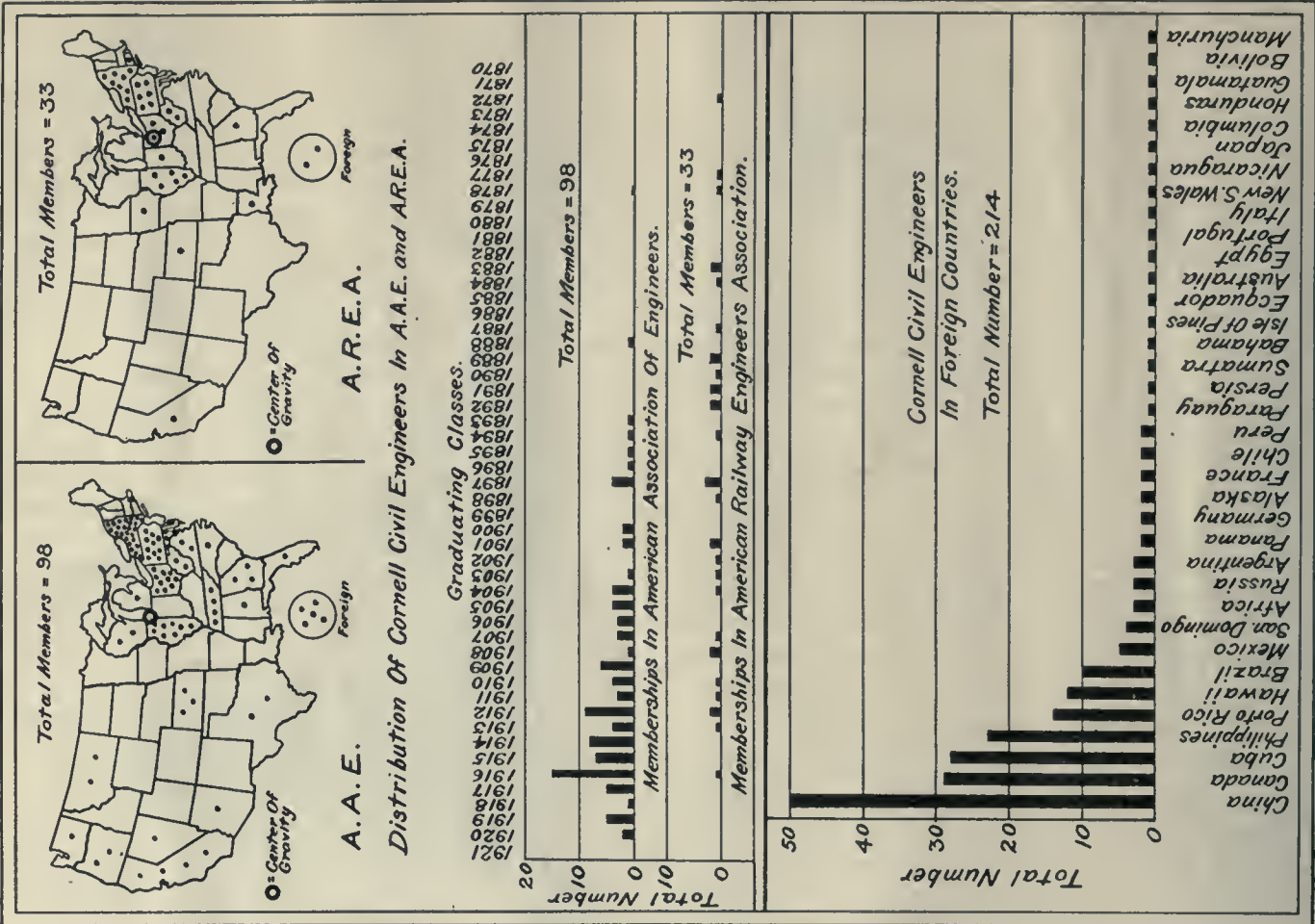
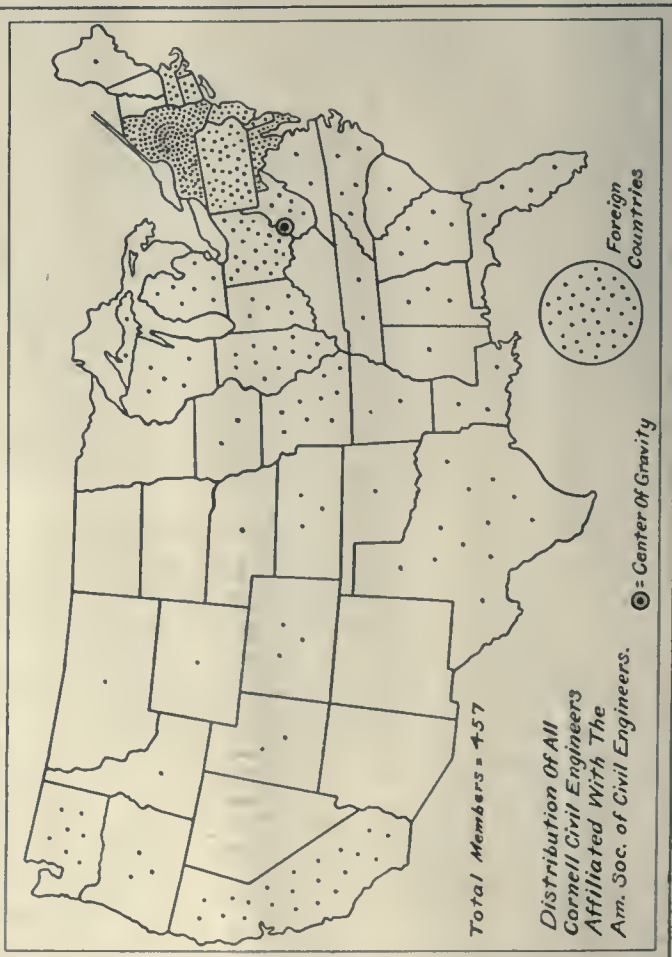
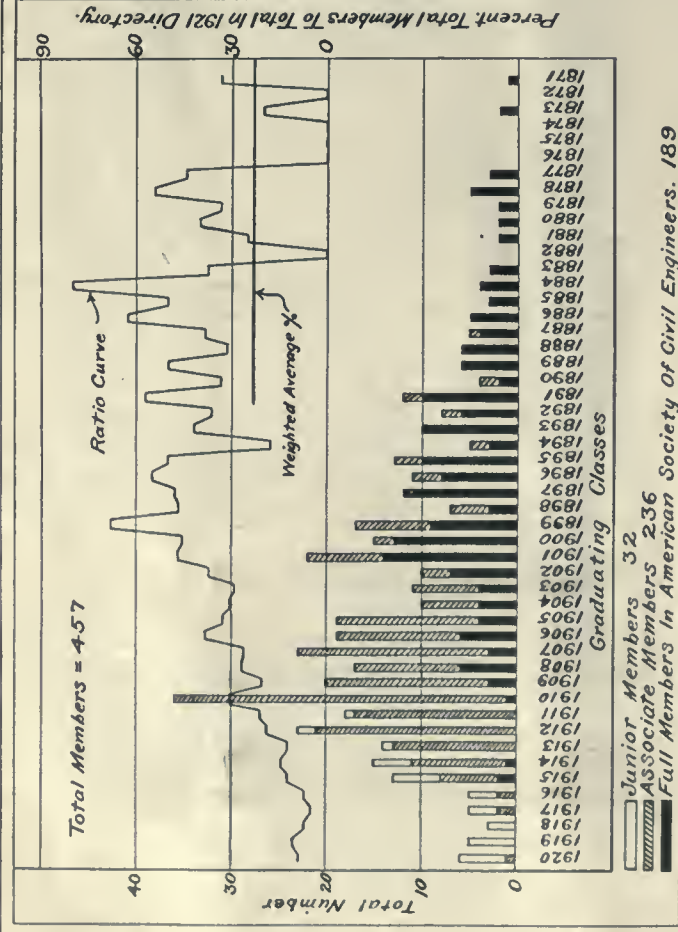
The interest manifested in this Society by Cornell Civil Engineers is shown on Plate II. In the upper chart are shown for each class the total number of memberships in the Society and the ratio of members to total number of graduates now living. This chart, as will be observed, bears a marked resemblance to the one on Plate I. Special attention is called to the fact that the ratio curve is in general horizontal. This feature must be taken to mean that interest in the work of this Society is not a function of age or experience, but that old as well as young take an active part in encouraging its growth. The total number of memberships in 1920 was 792, or 2 out of every 5 living graduates, a ratio of 40%. These data were not brought up to date in 1921 when the Society was enlarged to take in all Cornell Engineers and became the Cornell Society of Engineers.

In the lower chart of Plate II is shown the geographical distribution of the graduates belonging to the Cornell Society of Civil Engineers. When compared with the chart given on Plate I it will be seen that these men are scattered over the country nearly in the same proportion as shown for the total number of graduates. When the center of gravity is determined, however, for the Society members, and compared with that for the total it is apparent that the Society distribution is slightly unbalanced in favor of the East. This condition is to be expected, for the home of the Cornell Society is in New York City, on the extreme eastern edge of the entire country.

Foreign countries claim a total of 63 memberships in this alumni society. This is a ratio of 8 for every 100 members, or three members for each ten engineers in foreign lands; a commendable showing when compared with the ratio of four members for each ten engineers in this country.

The chief thought which must come to the minds of all readers when considering this subject is the outstanding fact that only 40% of Cornell Civil Engineers are members of their Alumni Society. If by some means this ratio could be increased the general welfare of the men, the College and the University would be greatly enhanced. This seems an opportune time and place to offer a suggestion.

A very strong sentiment is being manifested in all engineering and technical associations toward more democratic organization and management of



J. G. Brown

affairs, and greater cooperation of the parent societies with their local chapters. Why should not the Cornell Society of Civil Engineers follow in the same footsteps which have led those other societies to larger growth and greater service? It is sincerely believed that if the Cornell Society will break away from its time honored custom of holding its annual meetings always in New York City, and will select for this event some other large city nearer the center of Alumni population, many new members will be attracted to its fold and greater success will attend its efforts to serve. The City of Cleveland is suggested for this purpose. This may seem a radical thought, but no convincing argument can be advanced at this moment to prove its unreasonableness. A frank discussion of this suggestion in the columns of this magazine is cordially invited.

Membership in National Societies

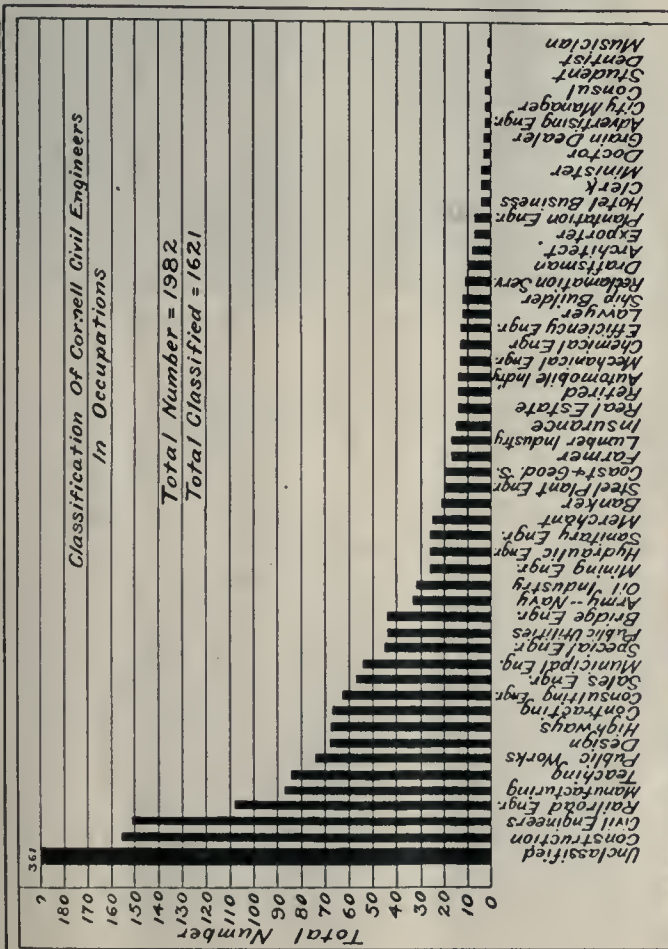
We come now to the consideration of the relation of Cornell Civil Engineers to the American Society of Civil Engineers, which is the oldest and greatest of the founder Societies in this country. Its requirements regarding education, technical ability and extent of practical experience are of such high standard that a full membership is justly considered a mark of success in the engineering world. An examination of Plate III will show to what extent Cornell men are affiliated with this great Society and are thus lending a helping hand for the advance-

ment of engineering science. We find that Cornell is well represented with a total of 457 affiliations, a slightly smaller ratio than one to four for the total number of graduates. Of this total, 189 are full members, 236 are Associates and 32 are Junior members. A spirit of perseverance and lofty ambition among engineers is admirably shown by this chart. The oldest men have nearly all reached the highest grade in the Society. The men of middle age have progressed half way to that goal, and the youngest men are seen to be just beginning their climb up the ladder of success.

The lower chart of Plate III shows the geographical distribution of Cornell men belonging to the American Society. It is very much like the other charts which we have studied, and the almost even distribution in this case also is seen by the position of the center of gravity of this membership. Of the 214 Cornell Civil Engineers in foreign countries, 38 are affiliated with this Society. This ratio of about one to five is only a little smaller than the ratio prevailing in this country.

The next two most prominent civil engineering societies in this country are the American Association of Engineers and the American Railway Engineering Association. The upper chart of Plate IV shows the distribution geographically and by classes for these two societies.

(Continued on page 118)



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A New Field for the Engineer

Discussing the opportunities which await Civil Engineers in the exploitation of the vast oil shales of the West

By CARL A. GOULD, C. E. '07
Superintendent, Russell Engineering Co.

THE engineer may now prepare himself to be of special benefit in an industry which is destined to be ranked with the largest industries of the United States: I refer to the Oil Shale Industry.

While the oil shale industry is a fact in many of the foreign countries it seems to have taken the garb of the "experimental stage", or we might say that it has adopted the policy of "watchful waiting", in the United States: "watchful" of the statistics showing the production and consumption of petroleum, and "waiting" for an opportune time to come in and fill the gap between consumption and production of well oil.

With a review of the present status of the oil production and consumption, there is no question left open to the denial of the fact that some day we will have exhausted our oil pools and, long before this time arrives, steps must be taken to develop our oil supply which at present lies dormant in the oil shale beds of the country. The crude petroleum statistics, Fig. 1, enables one to see at a glance the trend of the oil situation from 1909 to 1920.

That the development of the oil shale industry is well within the province of the civil engineer, as

well as special engineers, is borne out by the following facts: The oil shale fields in the Rocky Mountain States of Colorado, Utah, and Wyoming, have the largest deposits of high oil-content, workable shale



Fig. 2. Close view of oil shale deposits

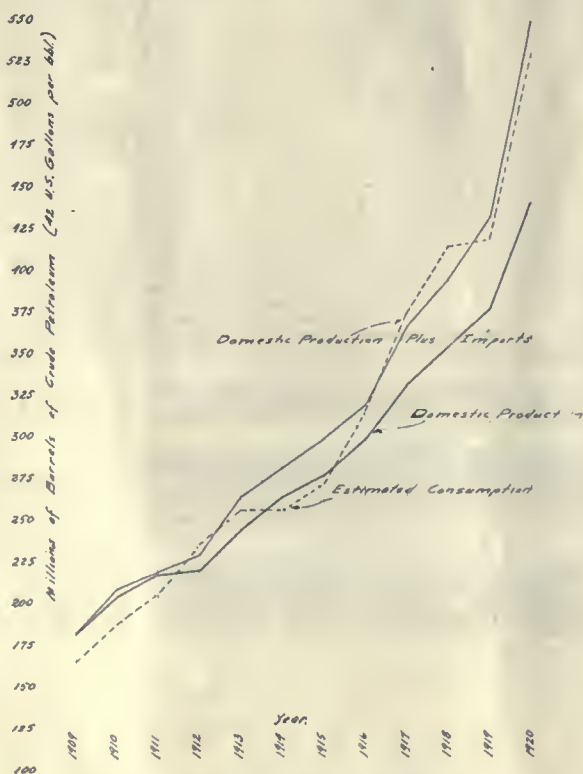


Fig. 1. Crude Petroleum Statistics

in the world; these fields are located some distance from transportation and their development will necessitate the construction and operation of various kinds of transportation facilities. There are no cities in the shale fields, but the development of the shale industry will call for innumerable little industrial centers to be built; these will have to be supplied with water systems, sewage systems, housing facilities, light, heat, and power. The raw material is so located in the mountains that modern mining methods will have to be used in getting the shale to the surface. There are a few deposits of shale which can be worked by the open quarry method, using a steam shovel and train to move the shale from the deposit to the shale plant. Tramway and cable-way construction will be frequent, as a means of moving the raw shale from the ledges to the shale plants.

(Continued on page IX)

ALUMNI NOTES

'86. Mrs. Flora M. Baker, wife of Charles H. Baker, died on March 11 at the Lenox Hill Hospital, New York. The funeral was held on March 14 at the Funeral Church, Broadway and Sixty-sixth Street.

'93. George M. Bacon is President of Bacon Multiplier, Inc., Newhouse Bldg., Salt Lake City, Utah.

'94. C. Morton Ayres is an Engineer and Architect at Tuscaloosa, Ala.

'96. Archibald S. Downey was elected president of the Northwest Chapter of the Associated General Contractors of America at the convention held in Portland, Oregon, on March 10-11. Mr. Downey has been located in Seattle, Wash., since 1899, and since 1909 he has been a partner in the firm of A. W. Quist and Company, with offices in the Hoge Building. This company had a large contract with the government at the Puget Sound Navy Yard and the Puget Sound Coast Defenses at Forts Worden, Casey and Flagler. Downey has been vice-chairman of the Industrial Bureau of the Seattle Chamber of Commerce, and president of the Seattle section of the American Society of Civil Engineers, and during the war he was chairman of the power plant committee of the Fuel Administration Board for the State of Washington.

'98. Robert H. Anderson is Consulting Engineer with the Tennessee Power Company at Chattanooga, Tenn.

'00. John A. Vogelsson, since 1910 chief of the Bureau of Health of Philadelphia, became chief of the Bureau of Surveys in the same city on March 15. His predecessor, George S. Webster, resigned more than a year ago to become a member of the Board of Engineers of the Delaware River Bridge Commission.

'01. Robert L. Burwell is a Specification Aid, U. S. Naval Experimental and Research Laboratory, Bellevue, D. C. He lives at 18 State Circle, Annapolis, Md.

'03. Joseph E. Craig is Chief Engineer of the Southern Clay Manufacturing Company, 701 Volunteer Building, Chattanooga, Tenn.

'05. Carl Ashley is Construction Engineer for the Gillespie Contracting Co., 1017 Ford Bldg., Detroit, Mich.

'05. Clarence E. Boesch, who was formerly the Principal Assistant to Gilbert C. White, Consulting Engineer at Durham, N. C., is now a member of the firm, Gilbert C. White & Co., at the same location.

'05. Lemuel B. J. Bryan has changed his address to Box 552, De Funiak, Fla.

'06. Robert Coltman, Jr., is in the Bridge Department of the Chicago, Rock Island, and Pacific R. R.

at Chicago, Ill. His residence address is 1444 W. 73d Street.

'07. Herbert S. Austin is Superintendent of the Interrefinery Pipe Line Department for the Standard Oil Company of New Jersey Bayway Refinery, Box 16, Elizabeth, N. J.

'07. Laurence J. Conger was recently elected President of the Corona Typewriter Company of Groton, N. Y., by the board of directors, to fill the vacancy made by the death of his father, the Hon. Benn Conger.

'08. L. M. Brockway is a member of the firm Conway and Reid, Engineers and Contractors, Room 1009, 709 Sixth Avenue, New York City.

'09. Fred J. Biele is Sales Engineer for the Ralph B. Carter Company at 152 Chambers St., New York City. He lives at 7622 7th Ave., Brooklyn, N. Y.

'09. Hart Cummings is Engineer on the Investigating Staff of the Kansas City Public Service Institute, Kansas City, Mo.

'09. G. Dave Curtis has been manager of the Morris Plan Company of Tampa, Fla., since its organization in 1917.

'09. John Dubuis is a civil and hydraulic engineer with offices at 500 Journal Building, Portland, Ore.

'10. Edward V. Baron has changed his address to 6956 Dorchester Ave., Chicago, Ill.

'10. Arthur J. Barzaghi has changed his address to 17 E. 48th St., New York.

'10. I. L. Birner is Sales Manager of the Water Softening Department of the Graver Corporation, E. Chicago, Ind.

'10. The following note taken from the Cornell Alumni News of March 16 should be of interest to our readers: The American Sugar Bulletin for January 14 contains a technical description of Central Jaronu, one of the premier sugar estates of the world which was created under the direction of Antonio G. Mendoza, assisted by a group of young men of Cuban birth and American education. One of the assistants was Leopoldo E. Freyre, '10. The Bulletin says: "In March, 1920, the tropical wilderness of Jaronu still slumbered undisturbed. Trails were rare and inhabitants rarer yet in the country on whose shores Columbus had beached his caravels more than four centuries before. It was part of the unexplored north shore of Camagney. On December 26, 1921, Jaronu, the sister estate of Cunagua, complete—forests cleared, cane matured, railroads built, bateys populated, factory ready—started its first campaign and a career that promises to be long and prosperous. Cunagua and Jaronu together will long be noted as the premier sugar estates of the

world. Built respectively during the Cuban crisis of 1917 and the present crisis on the Island, Cunagua and Jarou presented many difficulties in construction and administration. These handicaps served but as spurs, however, to the initiative and the creative talent of the constructors." It now stands a two-tandem house, capable of making 600,000 bags of sugar, and prepared to add a third tandem to increase its capacity to 900,000 bags. The buildings are of fireproof steel construction, and the factory is equipped throughout with General Electric Company equipment.

'10. Albert P. Haney is now Chief Engineer for John J. Turner and Sons, Engineering Contractors, Amsterdam, N. Y. He was with the Corrugated Bar Company for eleven years. Haney is married and has three children, John aged nine, Billy, seven, and Dorothy, three. They live at 6 Summit Ave., Amsterdam.

'12. John P. Bonner is a member of the firm of Scott & Bonner, Civil and Mining Engineers, Berkeley, W. Va.

'13. Charles F. Bauer is Assistant Engineer for the Mason and Hanger Co., at DuBois, Pa.

'13. Edwin G. Bolger is a mining Engineer in Marion, Ill. His address is 518 So. Market Street.

'15. Harry S. Andrews is Assistant Engineer with the McClintie-Marshall Construction Co., Pittsburgh, Pa. He lives at 814 Penn Ave., Wilkesburg, Pa.

'15. Mr. and Mrs. Robert Sayre Kent announce the marriage of their daughter, Katharine Vaughan, to Walter Farmandis Munnikhuisen, on February 25 in Christ Church, Brooklyn, N. Y.

'15. Howard B. Wright is Assistant Estimating Engineer with the Semet Solvay Company, Syracuse, N. Y., estimating on costs of new coke ovens and by-product apparatus. His residence is at 407 Schuyler street. He has two children, Dorothy, aged four and a half, and Robert, two and a half.

'16. Wilson T. Ballard is Assistant Engineer with the Baltimore Paving Commission, Baltimore, Md.

'16. Charles P. Frost has changed his home address to 16 Hammersly Ave., Poughkeepsie, N. Y. He is with the B. & M. R. R. at Medford, Mass.

'17. George F. Buckman is on a three months' trip to Europe. He will return in July.

'17. Edward A. Chandler, Jr., is associated with the Bartlett-Hayward Company, Baltimore, Md. He lives at 615 Melville Ave.

'17. Mr. and Mrs. Harold G. Miller announce the birth of a son, Andrew Dutton, on January 31.

'19. James H. Lynch is President of the Hornell, N. Y., Chapter of the American Association of Engineers.

'20. Joseph M. Smook, formerly designer and draftsman in the construction department of the Stonega Coal and Coke Company, Big Stone Gap, Va., has been appointed Aid with the U. S. Coast and Geodetic Survey and is now located in Wisconsin.

'20. Eduard Fritz, Jr., is Assistant Engineer in the engineering department of the Pennsylvania State Public Service Corporation, Johnstown, Pa. His address is 810 Edgehill Drive, Westmont, Johnstown, Pa.

'20. John P. MacBean, Jr., is in the City Engineer's Office, St. Petersburg, Fla.

'21. Damon G. Douglas is with the Turner Construction Company, 12 North Orange Ave., Orlando, Fla.

'21. Richardson Selee is a First Lieutenant in the U. S. Army and is stationed at present at Camp Humphreys, Va.

THE CORNELL CIVIL ENGINEER

(Continued from page 115)

Cornell is represented in the A. A. E. by 98 members, or one member for every 20 graduates. It is worthy of note that the greatest membership in this society occurs among the younger men, and if the ratio be computed only for the classes of 1893 to 1920 inclusive, it is found to be 1 to 17. The aim of the A. A. E. is to raise the standard of the Engineering profession by lending a helping hand to the rising generation of engineers, and it is natural to find that the younger classes furnish the greater number of memberships. It is to be hoped that this Association will prosper and that each year the ratio of members to total number of engineers will steadily increase.

The A. R. E. A. is strictly a technical association. Cornell is represented here with 33 members or 1 for every 60 graduates. 108 Cornell men are engaged in railroad engineering, so we can say that approximately one-third of them are members of the chief railway engineering society. It will be noted that the distribution is not limited, as in the A. A. E., mainly to the younger classes, but is quite evenly distributed among old and young.

As both societies have headquarters in Chicago it is quite logical to find the centers of gravity somewhat farther west than for the other cases already considered. It is noticeable, however, that the effect of this location of headquarters on general distribution is only slight. Both of these associations have a small foreign representation.

It is interesting to continue this subject farther and note the representation which the Cornell College of Civil Engineering has in the many other technical organizations in the country. In the lower chart of Plate V we find this information all assembled for ready reference. The societies named there are not all strictly engineering societies, but are more or less technical bodies working for the advancement of science, and in which work all engineers are interested.

Thirty-one different classifications are given in the chart, and they are arranged in order of number of members in the various societies. Let it be re-

(Continued on page 122)

Henry Sylvester Jacoby

HENRY SYLVESTER JACOBY was born on April 8, 1857, near Springton, Bucks County, Pennsylvania. After attending the public schools of Bucks County and the preparatory department of Lehigh University, he entered the course of Civil Engineering in 1873 and graduated from Lehigh University in 1877, receiving the degree of Civil Engineer.

During the first nine years following his graduation, Mr. Jacoby was employed on surveys in Pennsylvania, Louisiana, and Tennessee, serving in various capacities under the Corps of Engineers, U. S. A. For six years of this period he was chief draughtsman in the United States Engineer's office in Memphis. In the fall of 1886 he went back to Lehigh University as Instructor in Civil Engineering, where Mansfield Merriman, with whom Mr. Jacoby was afterwards to collaborate in the writing of their well known series of text books, was in charge of the department of Civil Engineering.

In 1890 Professor Jacoby came to Cornell as Assistant Professor of Bridge Engineering and Graphics. In 1894 he was made Associate Professor, and in 1896 he was relieved from giving instruction in drawing. Again, in 1898, as the College of Civil Engineering grew in numbers, descriptive geometry was transferred to another department. In 1900 he was appointed Professor of Bridge Engineering. During the years 1890-1898 Professor Jacoby was the author of the following texts: "Notes and Problems in Descriptive Geometry," 1892; "Outlines of Descriptive Geometry, Part I," 1895; "Part II," 1896; "Part III," 1897; and "A Text Book on Plain Lettering," 1897. During this

same period also appeared Merriman and Jacoby's series of "Roofs and Bridges" in four volumes. This was an exceedingly valuable contribution to the field

of structural engineering. The aim of keeping it up to date has been the constant endeavor of the authors since its first appearance. In 1909 Professor Jacoby published his text on "Structural Details and Elements of Design of Timber Framing," and in 1914, in conjunction with Professor R. P. Davis, M. C. E. '08, "Foundations of Bridges and Buildings."

Professor Jacoby has always been vitally interested in the work of the national engineering societies, being affiliated or a member in, The American Society of Civil Engineers, The American Association for the Advancement of Science, The Society for the Promotion of Engineering Education, The American Railway Engineering Association, and The American Society for

Testing Materials. He has made many valuable contributions to the publications of these societies, besides serving as a member of some important committees. From 1906 to 1911 he was chairman of the Standing Committee on Wooden Bridges and Trestles of the American Railway Association. He was Secretary of the Society for the Promotion of Engineering Education from 1900-1902 and President 1915-1916.

While to the outside engineering world, Professor Jacoby was best known on account of his contributions to engineering literature and his activity in promoting the work of its organized bodies, by his former students he is remembered as one who strove to inculcate in them the necessity of proper attention to detail, and the systematic arrangement of all their



work. The great amount of time and effort required as an author was not allowed to affect the quality of his teaching, which has always taken first place in his thoughts and which he has so successfully made the main accomplishment of his life. But many summers and sabbatical years were spent in writing and in travelling all over the country seeking and finding knowledge of all kinds of existing structures.

During his thirty-two years at Cornell he has built up the department of Bridge Engineering from three elementary courses to a department giving instruction in all branches of Structural Engineering to graduate and under-graduate students alike. In addition to training students he has also trained many teachers, who after a few years under him here at Cornell, have gone to responsible positions in other institutions, where, without exception, they have made good, due in large part at least, to their excellent training under Professor Jacoby.

In addition to his membership in the national engineering societies referred to above, Professor Jacoby belongs to the following clubs or societies: "The American Society of University Professors," "The American Social Hygiene Association," "The Cornell Society of Civil Engineers," "The University Club of Cornell," "Sigma Xi," and "Tau Beta Pi."

Besides carrying on his University work, Professor Jacoby has found time to become a state and national figure in the promotion of religious education.

L. C. U.

CHANGES IN THE CURRICULUM

By PROFESSOR F. A. BARNES, '09

Director of the School of Civil Engineering, Cornell University.

As the end of the year approaches I am glad to report that some progress has been made along practically all the lines mentioned in my forecast in the October issue. In some cases, this has been less than was hoped for; as teaching and getting our bearings have made it a busy year. Nearly all administrative problems have been solved happily, however, and more time will be available in the future for the consideration and working out of the larger policies.

Through the continued efforts and generosity of Professor Church and the Cornell Society of Engineers, the University was able to take advantage of a liberal quotation for the equatorial mounting of the twelve-inch glass and this is now well on its way toward completion. Dean Haskell is cooperating in completing the funds necessary for the installation of this instrument, which will make possible astronomical work of a high order. A Photomeasuring Micrometer has been purchased and other auxiliary apparatus will be installed with the Equatorial during the summer.

Progress has been made on construction of the experimental sewage plant and the installation of

the Fitz Overshot wheel. Most of the other apparatus mentioned in the October issue has been giving excellent service throughout the year; but more apparatus is needed in the hydraulic and testing laboratories. Extensive reconstruction is also essential in the hydraulic laboratory before full use may be made of the natural advantages for hydraulic research.

Dr. Schoder has been able to devote the entire year to the working up of the results of the experiments carried on by him and the late Professor Turner; having been relieved for the first term by the appointment of Captain Francis M. Dawson, M. C. E. '13, as Acting Assistant Professor of Hydraulics, and having been on leave of absence for the second term. The appointment of Professor Dawson and his retention for the second term to assist Dr. Schoder was made possible by the Heckscher Research Fund.

Only minor changes have been made in the curriculum. The new course in chemistry being taken this year by the freshmen and consisting of four hours per week throughout the year is believed to be a great improvement over last year's course of three hours which necessitated the separation of the lectures from the recitations and laboratory work. Sophomores took Integral Calculus and Mechanics together for the first time during the first term and, while the general impression was that the combination was giving difficulty, the result this year was not an unusual number of failures. Hence the scheme may work out better than was expected.

Technical Reports, omitted from the sophomore schedule this year to make room for Integral Calculus, will be given to both sophomores and juniors next year, Geology having been reduced to three hours in the sophomore year and three elective hours having been removed temporarily from the junior year for the purpose. The other three elective hours of the junior year will be used for Public Speaking, this subject having been moved back from the senior year. The junior year has also been increased one hour each term by making Hydraulics (1st term) and Municipal Sanitation (2nd term) four hours each, instead of three.

The only change in the senior year is to put in Highway Engineering as a required subject in place of Public Speaking, thus recognizing the increasing importance of training in highway work. It is believed that these changes will strengthen the curriculum and all interested in learning the details of the new requirements are invited to send in a request for the new Announcement, which will be published soon.

The following new courses have been authorized by the faculty:

181 General Astronomy, 3 hours per week throughout the year.

(Continued on page XII)



SCHOOL NOTES

C. E. WINS INDOOR MEET

Our contemporary the "Cornell Daily Sun" appeared on March 20 with a five column screamer across the top of the sports page, with this heading "C. E. PROVES ABILITY IN INDOOR MEET". The winning of this indoor meet strengthens our chances of winning the intercolleage trophy. But in order to win the trophy more must be done. Intercolleage baseball will start in a few days. Last year we had a fair team until general interest was lost and the team died out. This year we've got to win the intercolleage baseball meet in order to win the coveted intercolleage trophy. Not since 1914 have the C. E. Library walls been decorated with a new trophy. Time we got busy. But to get back to this indoor meet:

If it had'nt been for a few interested C. E.'s, C. E. would have come trailing along in last place. The combined efforts of Bill Van Pelt, '22, Bob Becker, '22, Max Kupfer, '22, H. G. Hunt, '22, and M. C. Newton, '24, resulted in C. E. placing in every event but one. C. E. romped away with the laurels by outclassing its nearest rivals, M. E. by seven points. Architecture, Arts, Ag. and Chemistry trailed in the order mentioned. The outcome of the meet was not assured until the last event. In this event Kupfer took first and Newton second while M. E. gained one point by capturing third.

The summary:

Standing Broad Jump: Van Pelt, second

Rope Climb: Becker, second

Standing High Jump: Van Pelt, second

Medicine Ball throw: Hunt, first; Becker, third

Standing Hop, Step and Jump: Van Pelt, first

Potato Race: Kupfer, first; Newton, second

Running High Jump: No place.

THE ANNUAL C. E. BANQUET

The annual banquet of the Cornell Student Chapter of the A. S. C. E. was held in the Prudence Risley dining hall on Friday, April 28.

The banquet started about 8:30 when all sat down to a real "square" meal. From beginning to end the "feed" was sufficiently attractive to keep everybody actively engaged in "filling up". After the desert had disappeared, the cigarettes were passed and everybody leaned back to enjoy a smoke while examining the favors that were given. Lefax notebooks were the main features but the handbooks on Southern Pine donated by the Southern Pine Association and several other books containing valuable information for engineers were also very attractive.

"Tommy" Thompson '22 was toastmaster and master of ceremonies in one. His usual clever jokes combined with his witty introductions of the speakers were by no means the least interesting bits on the program. Livingston Farrand, President of the University, and Edward J. Pierson, President of the New York, New Haven and Hartford R. R., were the main speakers of the evening. Dean Kimball of the College of Engineering and Professor Barnes, Director of the School of Civil Engineering, also gave their usual interesting talks on subjects of immediate interest to C. E. students. Barreto's all C. E. Band furnished the music and A. L. Satterthwaite was the only stunner of the evening, and he entertained the crowd royally for a few moments with clever card tricks. It was only with the greatest regret that we arose and sang "Evening Song" and departed for our rooms murmuring appreciation of a perfect evening.

READY ALL—STROKE!

With but a few weeks remaining before the Spring Day Races, early indications point to a favorable season for the C. E. Crew. About twenty men have been reporting regularly on the machines at the Old Armory. While no definite assignments have been made, two tentative combinations have been rowing together for about one month. The "first" crew, composed of more experienced oarsmen, has been showing up very well. It is stroked by Morehouse and manned by (1) Wright, (2) Thompson, (3) Estell, (4) Lovan, (5) Hemberger, (6) Daddysman, and (7) Whitney. Lovan and Whitney are two veterans of last year. The second crew is giving the first some very keen competition and is made up as follows: (1) Conkling, (2) Duffy, (3) Punzelt, (4) Amreich, (5) Scott, (6) Dudley, (7) Slack and (8) Veeder. Lucas and Hohlweg are the coxswains. Shifts in either boat are liable to be made at any time by Coach Olney.

"BUSTS"

The number of students dropped from the rolls of the School of Civil Engineering at the close of the first term was as follows:

Sophomores	9
Juniors	3
Seniors	1
—	
Total	13

This number compares favorably with the number of students dropped from the Engineering College, which includes M. E., C. E. and E. E. Eight men were dropped from the Senior Class, 21 from the Junior, 40 from the Sophomore, and 52 from the Freshmen, making a total of 121 students dropped from the Engineering College at the end of the first term. This is almost half of total for the whole University. The total number of students dropped from all the colleges in the University was 265.

FACULTY NOTES.

During the spring recess Professor Seery attended the Dayton meeting of the American Society of Civil Engineers which was held for the purpose of discussing hydraulic and water supply problems. He made inspection trips to the Miami Conservancy District and also visited the Case School of Applied Science in Cincinnati. Professor Seery returned to Ithaca on April 12.

Due to the illness of one of the professors at the Carnegie Institute of Technology, "Pat" O'Rourke has been granted a leave of absence to teach at Carnegie Tech. until the end of this term. He left for Pittsburgh on April 19 and will return to Ithaca in time to instruct at the Summer Survey Camp.

THE CORNELL CIVIL ENGINEER

(Continued from page 118)

membered that this classification applies strictly to Cornell Civil Engineers now living. We note that of a total of 1982 graduates 1163 or 59% have affiliations in one or more of the many technical organizations; 819 graduates or 41%, belong to no society. If to this number we add those who belong to the Cornell Society but to no strictly technical body we should find that more than half of all the graduates are making their way through life without the assistance of those societies which could most certainly benefit them. It is evident from the figures given that membership in one society is a great stimulus to become a member of another. While only 1163 men are connected with the various organizations, those same men are holders of a total of 1660 memberships. In other words, an average of every two men in three are members in two different societies.

Many states and large cities support state or local societies of great merit. Among the states most prominent in this respect are New York, Pennsylvania, Wisconsin, Illinois, Ohio, Washington and Maryland. Altogether they comprise a group fifth in order of number in the chart. The foreign societies make the next group in order. Those of the greatest importance are the Chinese, Phillipino, Cuban, Canadian and Porto Rican societies.

While it is not practical to give space here for a discussion of the subject of representation of Cornell men in all of the societies named, a close study of the chart will reward the reader with much seed for thought. If data were at hand by means of which we could determine the exact ratio of total members in all of the various societies to the total number of civil engineers in the country, it is quite probable that that figure would fall considerably below the percentages shown by the charts for Cornell men.

In the study of all these various points of interest we have kept constantly in mind the idea that the information presented applies strictly to Civil Engineering graduates of Cornell. It is believed, however, as these men are probably typical of the most successful group of the grand total of civil engineers in the country, that the number from which the conclusions have been drawn is large enough to warrant the application of these same conclusions to civil engineers in general. With this thought in mind, a brief summary of the points thus far brought out may serve to make them clearer.

1. As a student in some college of engineering, the chance that you already hold some baccalaureate degree is about 1 to 13. The chance that you will not go farther than to be graduated with the degree of Civil Engineer is about 20 to 1. If after graduation as a C.E. or an M.C.E. you obtain some other degree, then you are 1 man in 65. ;

2. After receiving your degree and beginning

(Continued on page VIII)

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Dr. George M. Price, writing on "The Importance of Light in Factories," in "The Modern Factory," states: "Light is an essential working condition in all industrial establishments, and is also of paramount influence in the preservation of the health of the workers. There is no condition within industrial establishments to which so little attention is given as proper lighting and illumination. Especially is this the case in many of the factories in the United States. A prominent investigator, who had extensive opportunities to make observations of industrial establishments in Europe as well as in America, states: "I have seen so many mills and other works miserably lighted, that bad light is the most conspicuous and general defect of American factory premises."

"My own investigations for the New York State Factory Commission support this view. In these investigations it was found that 36.7% of the laundries inspected, 49.2% of the candy factories, 48.4% of the printing places, 50% of the chemical establishments, were inadequately lighted. There was hardly a trade investigated without finding a large number of inadequately lighted establishments."

Inadequate and defective lighting of industrial buildings is not confined to the establishments in New York State alone. The same conditions prevail in most sections of the country.

Such conditions as mentioned above are entirely opposed to the laws of health, sanitation and efficiency. Wherever poor lighting conditions prevail, there must be a corresponding loss of efficiency and output both in quality and in quantity. American industry is not using nearly enough daylight and sunlight in its buildings. Every endeavor should be made to use as much as possible of daylight for lighting purposes. To obtain this it is of course necessary that the rays of daylight and sunlight are permitted to enter the interior of the buildings as freely as possible, with the important modification that the direct rays of the sun must be properly diffused to prevent glare and eyestrain. A glass especially made for this purpose is known as Factrolite, and is recommended for the windows of industrial plants. Windows should be kept clean if the maximum amount of daylight is to pass through the glass, but the effort will be well repaid by the benefits secured.

In the presence of poor lighting, we cannot expect men to work with the same enthusiasm as when a well lighted working place has been provided. The physical surroundings have a deep effect upon the sentiments of the employees, and where bad working conditions are allowed to prevail, there is invariably a lessening of morale and satisfaction created thereby. Neglecting to utilize what nature has so bounteously provided, daylight, and which is so essential toward industrial efficiency, we have an instance of wastefulness, but now that the importance of good lighting is becoming recognized, undoubtedly more attention will be given by progressive industrial employers to furnishing the means which are essential for their workers to secure and maintain the efficiency, which counts for so much in the success of any industrial concern in this competitive age.

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THE CORNELL CIVIL ENGINEER

(Continued from page 122)

your active life work, you can consider yourself as one of the nine men still in the harness from every ten who started. The probability is that you will be located in some city east of the Mississippi River. Only one engineer in 7 is located in the West. You will probably not go to a foreign country to work for only 1 in every 9 follows that course.

3. The probability is that you will engage in engineering or some closely allied branch, for not more than 1 in 10 leaves the field entirely. You will probably become a member of some technical organization, for about 6 out of every 10 do so. Your membership, may be, however, in only your alumni or a local society. Only 1 engineer in 4 joins the American Society of Civil Engineers. Of those affiliated with that Society 50% are Associate Members, the other half being divided between the Juniors and the full Members. The chance that you will belong to any of the other technical societies is only 1 to 10. Of those in foreign countries only 1 in 5 belongs to the engineering societies in those countries.

No attempt has been made to present here an exhaustive study of the information to be found in the directory, and without doubt the charts contain many other points of interest which might lead to valuable conclusions. One important subject about which little has been said thus far is the nature of the occupations which the civil engineer follows. A

few words will be added about this subject and then the reader will be left to continue the study by himself.

It is common practice for young men to enter upon a college course in engineering with a mind well made-up regarding the particular work which they desire to follow in after life. They do not realize how much their futures will be governed by circumstances. It is probably safe to say that only a very small number are able to follow to the end of life a carefully planned course.

Classification of Occupations

In the upper chart of Plate V is shown the classification in occupations of all Cornell civil engineers. A glance at this chart shows the great diversity of work which the engineer is elected to do or into which he drifts. Fifty-two different classifications are noted here and others might be added. As the number of engineers increases year by year the field must broaden to make room for them all.

Of the total number of 1982 engineers 1621 are actually classified in this chart. Sufficient information is not given concerning the remaining 361 to enable us to place them definitely. It may not be amiss to add here that in sending in information for the annual directory, special care should be exercised to make it complete and accurate. Such statistics are too valuable to be slighted.

It will be noted that 35, or about two-thirds of the various occupations listed, are strictly engineering work or are so closely allied to it that the men engaged must constantly apply their engineering education and technical knowledge. Sixteen of the occupations named cannot be classed as engineering. They include, however, only about 168 men, showing that not more than one in ten of all engineers desert the field for other work.

Information is not at hand to show how often the men classified have shifted from one occupation to another. The engineer is a victim of circumstances, and his work is the first to suffer in times of industrial depression. A few can be highly specialized and follow along definite lines, but the great majority must have a broad education and training and be able to adapt themselves quickly to new and untried fields.

In times like these which we are now experiencing when all important works are suspended, engineers are driven rapidly from one position to another. Many find themselves out of employment and are forced into other lines of work, perhaps never to return to the fold. When circumstances force such moves upon us, some are surprised to find that their positions in life are improved by the change. It cannot be denied that many are struggling along in some line of engineering work, dissatisfied and discouraged. They are out of their proper element and would achieve much greater success and happiness in some other line. A small dissatisfied element does harm to the whole number.

(Continued on page IX)

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For most men engineering is merely a vocation. It is a profession only for those who follow it because they enjoy it, and who make it not only a means of livelihood but strive also by study, by affiliation with technical societies, and by word and deed to advance science and promote the welfare of their fellow engineers. There is not room at the top for all, nor can all who reach the top expect to remain there. Our statistics show that only about one in seven attains the rank of president, manager, superintendent or chief engineer. The other six must be content to fill the lesser positions along the ladder of success. No one should be reproached if he finds the way too thorny and departs for other fields where greater rewards are assured. Success is possible only where there is pleasure and enthusiasm in the work, and whether it be a business or a profession everlasting vigilance is necessary, or we fall like Humpty Dumpty, never to be set up again.

A NEW FIELD FOR THE ENGINEER

(Continued from page 116)

The shale plant design is of a special nature and necessarily will be handled by men familiar with the chemistry of retorting and gas-works practice; however, the construction of the shale plants will follow the standard engineering practice as carried out in industrial plant construction. The operation of a shale plant, including oil refineries and by-products

plants, will be along the same general lines as now employed in other manufacturing enterprises supplying hydro-carbon and bituminous products for the market.

A view of the shale fields is shown in the cut on the front cover.

In general, we may take this as typical of the shale lands of Colorado, Wyoming, and Utah: While this view might give one the impression that the shale lands are on what might be termed the "frontier," this is by no means the case. The hundreds of little valleys found in the shale districts can nearly all boast of a settler or two, who is doing a little agricultural work in the valley and ranging a few cattle on the mesas above. In some parts of the oil shale area, the mesa land is used as winter grazing ground for large bands of sheep; the sage brush affording excellent feed during the months of February and March.

Fig. 2 shows a close view of the oil shale deposits.

For the most part, these deposits, in what might be termed the workable area of the shale district, are horizontal, or nearly so; the dip of the strata is just enough to make the mine workings ideal in the movement of the shale to the main entries of the mines, and to provide drainage for the properties.

While it is true that deposits of the shale are of enormous thickness, running into hundreds of feet, it must be remembered that these deposits have in-

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numerable layers of shale with very low oil content; in commercial development, it will be very unusual to find workable ledges of over 20 feet in thickness.

In general, we may use 1.75 as the specific gravity of the shale, and the oil content as one barrel (of 42 U. S. Gallons) to the ton of shale. This affords a very conservative method of estimating the potential supply of oil in the shales of the Rocky Mountain District.

Development Conditions

Weather conditions must always be considered when dealing with industries located in the mountains. The writer has had occasion to investigate climatological data, as furnished by the U. S. Weather Bureau, Dept. of Agriculture, covering weather conditions along the White River near the Colorado-Utah Boundary, and also to live in this district in 1920 and 1921; with the annual mean temperature about 45 Fahr., total precipitation about 10 inches, and the number of clear, or partly cloudy days of the year running well over 300, the ideal weather conditions for plant construction and operation, in this particular district, is evident.

Probably one of the first things which a company would wish to do in the development of its shale lands would be to definitely establish its boundary lines, both the outer boundary and the sub-division of its property into the various claims; each claim consists of 160 acres which follows the established government land divisions. The section corners, es-

tablished by the Government Survey, are in some cases very far apart so that a considerable amount of surveying skill must be used in locating the boundaries of the various claims.

It is necessary to comply with Federal Statutes pertaining to annual assessment labor; work, to the amount of \$100, must be done on each claim, each year, for five years, at which time application may be made for patent. As a rule, development of the industry on a large scale will be done on Patented Lands.

Water rights, for any particular development, should be secured at the nearest available source to the shale land; this is important as it requires a considerable amount of water for use in the oil shale plants, shale oil refineries, and domestic purposes. In some cases it will undoubtedly be necessary to build dams, impound rain water and water from the melting snows, and to take every precaution against a possible shortage of water at any time of the year. Water requiring special treatment is not an uncommon thing in some parts of the shale districts, however this will not be a serious matter.

Location of Plant

The location of the plant sites will be a problem in which the engineer will have opportunity to use all his knowledge with respect to industrial plant location, construction, operation, and maintenance. In many cases the workable shale ledges are several hundred feet above the valley; this affords many

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ways in which plant installation can be made. For example: there may be a natural plant site half-way up the slope which would necessitate tramways for getting raw material to the plant, the remainder of the slope, and the valley below, to be used as a dump ground for the spent shale. The topography of the country may be such that the plant can be advantageously located at the shale ledge which is to be worked, or perhaps at the foot of the slope next to the valley land. Thus it is seen that a shale plant location involves a comparison of cost figures, both as to construction and operation, which will best suit the conditions over a period of years of operation.

The item of transportation is one of large moment in the development of the shale industry. The ultimate means of transporting labor, materials, and products will unquestionably involve a combination of all the present known methods, due to the fact that railroads will not build into the shale fields until assured of some business and, on the other hand, no company will start development on a large scale without providing transportation of some sort, in and out of the shale fields. Thus we will have railroads, highways, pipe-lines, tramways, and cableways, all functioning in the transportation end of the oil shale development work.

Many of the large oil companies now control vast areas of oil shale lands. The investments of these

companies represent a certain amount of faith in the future possibilities, and we might say "probabilities", of oil shale; experiments are being carried on in their laboratories to determine the quality of the shale, the methods of procedure to use in extracting the oil from the shale, and the kind of treatment necessary to be carried out in the refineries in order to place a first class product on the market. These oil organizations are composed of men who hold their positions as a result of ability and keen vision, and it is their duty to make investments in property which are, or will be, dividend producers.

It is reasonable to suppose that the Oil Shale Industry will "bloom forth" on us as a reality some day, and that day may not be so far ahead of us.

CHANGES IN THE CURRICULUM

(Continued from page 120)

- 182 History of Astronomy, 3 hours.
- 183 Elements of Practical Astronomy, 3 hours.
- 184 Modern Astronomy, 3 hours.
- 185 Practical Astronomy, 3 hours.
- 205 Advanced Drawing, 3 hours.
- 206 Applied Descriptive Geometry, 3 hours.
- 275 Investigation of Existing Bridges, 3 hours.
- 280A Concrete Construction, 3 hours, a special course for architects.

All of these courses except the last are elective.

THE CORNELL CIVIL ENGINEER

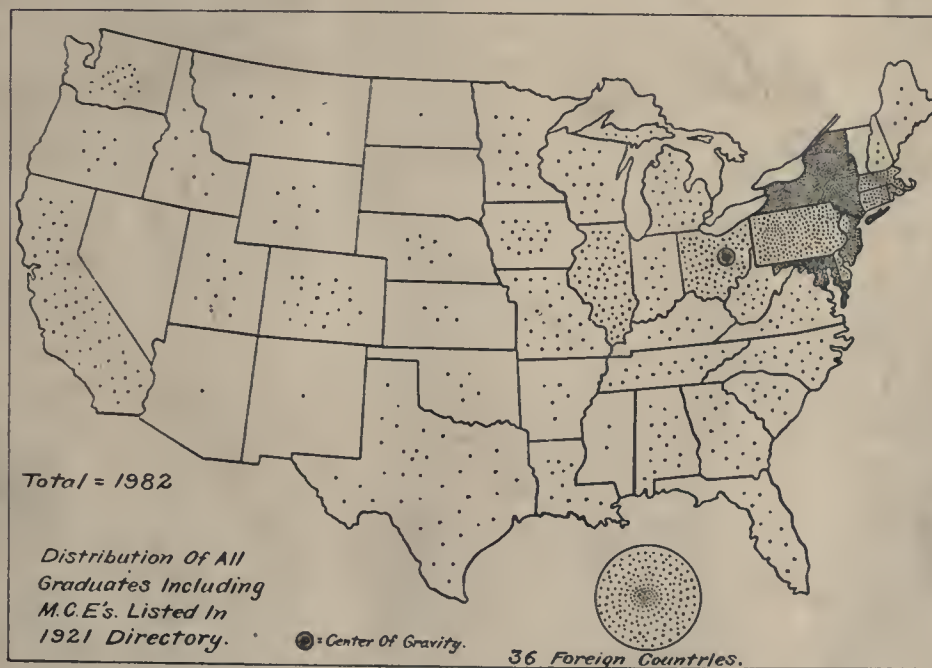
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MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

VOL. XXX, No. 9

JUNE, 1922

Directory of Graduates of School of Civil Engineering



Showing the Geographical Distribution of Cornell Civil Engineering
Graduates, based on the 1921 Directory



The Great Rajasamand Dam

The ruler of Rajputana, in the heart of India, began the great dam "Rajasamand" in 1661. This vast pile of white polished marble, hidden so well in the Aravalli Mountains, has remained almost unknown for generations. It is a colossal monument to these early engineers.

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It is doubtful whether modern engineers can build a better structure; but today they must also consider costs. Explosives have made possible the building of dams larger than Rajasamand and equally as enduring, with much less labor and in less than one-

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JUNE, 1922

Cover Illustration

One of the diagrams published in our May, 1922 issue with Mr. G. C. Brown's article, "The Cornell Civil Engineer, Where he is and What he is Doing". The data on which this diagram is based were obtained from last year's June directory.

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Transactions of the Association of Civil Engineers of Cornell University

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No. 9

EDITORIALS

POLICY

With the advent of the new Board of Editors, certain old methods of procedure will be continued, others will be modified and several entirely new departments will be inaugurated. Before going ahead and amplifying on these proposed changes let us look back and study the record of the past year. The college year 1921-22 saw a general improvement in the typography and make-up of the **Cornell Civil Engineer**. Heavier type faces were used and more attention was paid to uniformity of appearance throughout. The date of publication was advanced from the twentieth of the month to the first of the month. This enabled us to get the copies mailed before the fifth of the month, with the result that all subscribers received their magazines before the tenth. Last year was a fruitful one in the number of technical articles submitted for publication. We wish to thank our Alumni for their excellent support in supplying us with articles during the past year and to express the hope that they will continue to support the magazine by a good response with articles during the coming year. A number of articles which were published last year were of sufficient merit to be re-printed by some of the national technical magazines. **ENGINEERING NEWS-RECORD** printed two short announcements of articles appearing in the **Civil Engineer**. During the year, **ENGINEERING AND CONTRACTING** re-printed five articles and **THE CANADIAN ENGINEER** re-printed one article published by the **Civil Engineer**. This is indeed a creditable showing and is one which the new Board hopes to duplicate. Last December, the old College Notes Department of the magazine was re-named School Notes, the intention being to print under the new heading only those items of news which chronicled the happenings in the School of Civil Engineering. However, since there still remained a demand for news of the university at large, the new University Notes Department was installed in which the more important doings of the university community were noted. In the editorial department, then, the **Civil Engineer** was improved in appearance

and make-up and much departmental revision was experimented with during the year 1921-22. Let us now turn our attention to the business department.

From a business standpoint; last year did not show much improvement over previous years. Much the same procedure was followed as in the past, with two striking exceptions. First, a new system of bookkeeping and accounting was installed in April by the business department. This systematized methods and made for more efficient and accurate transacting of the business. Second, the Circulation Department was cleaned up and systematized in February which made for a better and more rapid handling of subscriptions. However, the same old stumbling block was met this year as in previous years. The same difficulty in collecting subscription money and in "making both ends meet" was experienced last year. It seems a pity that the business department is only able to collect sixty per cent of its subscription money every year. It may be a reflection on the work of the business department but more correctly we think it is proof of a lack of co-operation and support on the part of our alumni. During the coming year the Business Department will strive with greater energy to see if it cannot collect the subscription money more promptly. Such briefly is what has happened to the **Civil Engineer** during the past year. Let us next turn to the prospects for the future.

Broadly speaking, the policy of the new Board will continue to be that which it has been in the past. We will work for a good magazine and then depend on the qualities of our journal for subscriptions and advertisements. Our motto will be with Edward W. Bok "Make a good magazine first; the advertising and subscriptions will take care of themselves".

How best we can accomplish this is a difficult problem. To solve it we will work more or less closely along the following lines. A new book review section will be inaugurated with the November number. It will be our especial aim to publish reviews of books written by Cornell men. The next

(Continued on page 147)

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All graduates of the College of Civil Engineering up to and including 1922

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Chaplin Constr Co Morgantown W Va
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Capt U S Air Service Langley Field Va [N Y]
- Brower, Irving C *CE '01*...MASCE MAAE MAWWA
City Manager City Hall Pontiac Mich
- Brower, Milton W *CE '11*..64 Walthery Ave Ridgewood N J
With Electric Bond and Share Co 71 Broadway N Y C
- Brown, Collingwood B Jr *CE '01*
MASCE MAREA MEIC Ithaca N Y
Engr Asst to V P Canadian Natl Rys Toronto Ont Can
- Brown, C. Wesley *CE '08*...142 Trafalgar St Rochester N Y
Real Estate 53 Arcade
- Brown, Edgar T *BCE CE '01* MAREA 1006 Weld St Little
Civil Engr P O Box 747 Clarksburg W Va [Rock Ark]
- Brown, Forrest J *CE '22*...East Marion N Y
- Brown, George A *CE '05*..3300 St Mary's Ave Hannibal Mo
Jeweler 307 Broadway
- Brown, Grover C *CE '06 MCE '09*
MASCE 204 Fairmount Ave Ithaca N Y
Asst Chief Civil Engr Cambria Steel Co Johnstown Pa
- Brown, Henry G Jr *CE '22*
32 No Arlington Ave E, Orange N J
- Brown, Homer C *CE '97*...502 No 64th St Seattle Wash
- Brown, John W *CE '12*...53 Ludlow St Waterbury Conn
Asst Engr McClintic-Marshall Constr Co Pittsburgh Pa
- Brown, J Winthrop *CE '14*...Millington N J
Engineer Blenton Bldg Corp 342 Madison Ave N Y C
- Brown, Leigh A *CE '12*...102 Eighteenth St Buffalo N Y
Chief Engineer Iroquois Gas Co 311 Iroquois Bldg
- Brown, Leon R *CE '11*...76 Winton Road S Rochester N Y
Engr in Ch Des & Tech Wk N Y State Rys 267 State St
- Brown, Morris E *CE '12*..43 Hawthorne Place Montclair N J
Vice-Pres Stephen Ballard Rubber Co 90 W Brdwy N Y C
- Brown, N Adelbert *CE '03* MRES 152 Post Ave Rochester NY
Special Assistant Engineer 52 City Hall
- Brown, P DeWitt *CE '13*...235 Chestnut St Sewickly Pa
Drftsm & Desnr Fort Pitt Bridge Works Pittsburgh Pa
- Brown, Rodney D *CE '13*..3215 17th St NE Washington DC
Highway Engineer U S Bureau of Public Roads
- Brown, William *CE '93*...Belvidere N Y
Farming
- Brownell, James P *CE '91*...MASCE Carthage N Y
Consulting Engineer 19 Strickland Bldg
- Bruen, Frank *CE '78*...29 High St Bristol Conn
Cost Engr The Sessions Foundry Co
- Bryan, Lemuel B Jr *BCE CE '05*...AMASCE
Box 552 De Funiak Springs Fla
- Bryant, Carleton E Jr *CE '22*
426 So Columbus Ave Mt Vernon N Y
- Bryson, Thomas B *CE '94*...AMASCE
Contractor 52 Vanderbilt Ave New York City
- Buchanan, George P *CE '14*...6113 Howe St Pittsburg Pa
Gen Sales H J Heinz Co
- Buck, John A *CE '15*...North Warren Pa
- Buckman, George F *CE '17*..Queen Anne Road Teaneck N J
- Budd, Percy H *CE '09*..AMASCE 84 Mtn Ave Summit N J
Mgr Constr Dept Universal Steel Exp Co Delhi N Y
- Bullard, George P *CE '18*...317 Eddy St Ithaca N Y
Draftsman McClintic-Marshall Constr Co Pittsburgh Pa
- Bullis, Abram R *BS CE '82*...Macedon N Y
- Bunn, Charles H Jr *CE '17* MAP 143 So Munn Ave E Orange
Civil Engineer Standard Oil Co Elizabeth N J [N J]
- Burdick, Roy D *CE '14*...Cuyler N Y
Captain C A C U S A 2391 Prince Edward St Honolulu T H
- Burés, Antonio S *CE '12*...Adjuntas P R
Asst to Chief Civil Engr So P R Sugar Co Ensenada P R
- Burgard, Willard H *CE '16*...30 Burgard Place Buffalo N Y
Care of Lackawanna Steel Co
- Burkhart, Ernest D *CE '13*...482 Delaware Ave Albany N Y
Engr Grade Crossings N Y State Pub Serv Comm
- Burnell, Eugene D *CE '06* MASCE P O Box 38 Sta H N Y C
Constr Mgr Adams Evans & Co 709 Sixth Ave

- Burnham, Clifford J *CE* '14..MAAE 3811 Seneca Ave Los
Sen Civil Engr Los Angeles Co Flood [Angeles Calif
Control Dist
- Burnham, E Lewis *AB CE* '07.....Berwyn Pa
1301 Morris Bldg Philadelphia Pa
- Burns, Samuel *CE* '22....741 W Main St New Britain Conn
- Burrage, John D *CE* '14..337 Washington St Newton Mass
125 Washington Place N Y C
- Burrows, Earl N *CE* '07 *MCE* '14 MAREA 214 Bryant Ave
Asst Prof Bridge Engrg School of Civ Engrg [Ithaca N Y
- Burt, LeVan M *CE* '01.....Guilford N Y
- Asst Engr Bur of Hwys 50 Court St Brooklyn N Y
- Burton, Floyd E *CE* '13.....Gotham Apts Kansas City Mo
- Burton, Frank H *CE* '13.....Denver Colo
- Partner Burton Seed & Prod Co 1500 Market St
- Burton, James T *CE* '14..MESPh 60 Pearl Ave Oil City Pa
Engineer South Penn Oil Co Pittsburgh Pa
- Burwell, Robert L *CE* '01 MAAE MASCE 18 State Circle
Statistician J A W Iglehart Co Inv Bankers [Annapolis Md
Title Bldg Baltimore Md
- Bush, Harold W *CE* '21.....Warsaw N Y
- Jun Hwy Engr Bur of Bridges Springfield Ill
- Butchers, Earle B *CE* '01.....604 Park Road Ambridge Pa
Engineer American Bridge Co
- Butler, William M *CE* '01.....309 Plum St Syracuse N Y
Vice-Pres & Treas Butler & Bedden Inc 950 Canal St
- Button, Ernest D *CE* '99....449 No Aurora St Ithaca N Y
- Pres J B Lang Engine and Garage Co 117-129 E Green St
- Butts, Harry W *CE* '11.....52 William St E Orange N J
- Manager Hedden Place Machine Co Inc 40 Hedden Place
- Cacho, Mariano M *CE* '16.....233 Gral Luna Manila P I
- Cadiz, Alvin G *CE* '15.....P O Box 611 Sea Cliff N Y
- Estmtg & Desng Truscon Steel Co New York City
- de Camp, Horace S *CE* '09.....317 Riverside Drive N Y C
- Treasurer 56 Commercial St Brooklyn N Y
- Campaneria, Juan M *AB CE* '13..MCuSE Consulado 114 Alt
Dist Engr Cuba Cane Sugar Corp Central [Havana
Perseverencia Pr Sta Clara Cuba
- Campbell, Harry G *CE* '14.....Windsor Hills Baltimore Md
- Supt Hbg W W Ext Harrisburg Pa
- Campbell, John B *BS CE* '14....324 Church Ave Roanoke Va
- Hydr Engr J B Campbell Co Bourse Bldg Phila Pa
- Canaga, Gordon B *AB CE* '07..AMASCE 4754 No Ninth St
Civil Engineer [Philadelphia Pa
- Canfield, G Howard *CE* '10.....AMASCE
Hydraulic Engineer USGS Juneau Alaska
- Canfield, Harold T *CE* '13....183 Harbard Ave Boston Mass
Asst Constr Engr Chas H. Tenney & Co
- Cannon, Clayton P *CE* '10....2618 Calvert St Baltimore Md
Constr Mgr B F Bennett Bldg Co 123 So Howard St
- de la Cantera, Fernando *CE* '15 Bur of Insular Affairs Wash-
Prof Univ of Philippines Manila P I [ington D C
- Capen, Charles H Jr *CE* '17 30 Whittlesey Ave E Orange N J
Asst San Engr State Dept Health Trenton N J
- Carey, Matthew L *CE* '15.....YMCA Greenwich Conn
Statistician U S Rubber Co 1790 Broadway N Y C
- Carlin, Joseph P *BS CE* '97 MASCE 270 Wash Ave Bklyn
Pres P J Carlin Constr Co 1123 Broadway N Y C [N Y
- Carpenter, Charles W *CE* '22.....Lake Mahopac N Y
- Carpenter, Clarence C *CE* '17.....Ada O
- Prof Civil Engrg Ohio Northern Univ
- Carpenter, Frederick W *CE* '84 MASCE Box 307 Newburgh
Cons Engr Bridge Comm Public Bldg Wilmington Del [NY
- Carson, Richard B *CE* '14....Woodlawn Inn Pittsfield Mass
- Carwell, David W *CE* '12..121 St Marks Ave Brooklyn N Y
- Cartwright, Frank P *CE* '15.....East Bloomfield N Y
- Tech Secy Comm on Standardized Bldg Codes Dept of
Commerce Washington D C
- Case, George W *BS MCE* '12 AMASCE MESWPa 3142 Ava-
Prof San Engrg Univ of Phgh Pittsburgh Pa [lon St
- Castillo y Grau, Antonio *CE* '10 AMASCE MCuSE Cienfuegos
Engr Board of Health & Cons Engr Box 1669 [Cuba
- de Castro, Anastacio F *CE* '21....1136 Singalong Manila P I
Asst Civil Engr Bureau of Public Works
- Caves, Stuart S *CE* '16.....Phelps N Y
- Superintendent Lumber Yard
- Cesario, Frank *CE* '16 c/o Antonio Cesario Port Chester N Y
- Chadeayne, Henry F *CE* '18.....Cornwall N Y
- With Thomas A Edison Inc Orange N J
- Chaffee, Sidney L *PhB BE in CE CE* '09.....Chalmers Ind
Farmer
- Chamberlain, Jos J Jr *CE* '11....AMASCE 1723 Grand Ave
Chief Engr Danis-Hunt Constr Co 908 Schwind [Dayton O
Bldg
- Chan, Iu-Choo *CE* '18.....MChES 63 Fung Yuen Tai St
[Canton China
- Chandler, Albert H *CE* '02....361 Gates Ave Brooklyn N Y
Asst Engr Queens Borough New York City N Y
- Chandler, Edward A Jr *CE* '17..23 School St Gardner Mass
Bartlett Hayward Co Baltimore Md
- Chang, Chen-Hsi *MCE* '21..MCES 3 Ehr-Chin-Lee Tientsin
[China
- Chao, Shen C *CE* '22.....Yuh sien Honan China
Grad Student Cornell Univ Ithaca N Y
- Char, Kwang Yi *CE* '12....7 Jessfield Road Shanghai China
Banking
- Chase, Clement E *CE* '10..AMASCE MASTM 52 Brookside
Prin Asst Engr Modjeski & Angier of [Dr Larchmont N Y
N Y 818 Widener Bldg Philadelphia Pa
- Chase, George A Jr *CE* '14..2003 Longwood St Baltimore Md
Mgr Claim Dept Home Friendly Ins Co
- Chase, Richard W *CE* '05....109 Madison Ave Holyoke Mass
Investments
- Chavanne, John J Jr *CE* '21....3969 Syosset St Woodhaven
c/o Nat Board Fire Underwriters 76 William St [N Y
N Y C
- Chen, Cheng S *CE* '17....7 Gin Erh Hutung Lin Chin Kon
Instructor College of Communications Peking China
- Chen, Mao K *CE* '12.....Lwai-Kiang Foochow China
Asst Engr River Improvement Comm Tientsin China
- Chen, Poo Wha *CE* '15 *PhD* '17.....Yungting Fukien China
Engr of Constr Tientsin Pukow Ry Tientsin China
- Cheston, James H *CE* '21.....89 Bruce Ave Yonkers N Y
- Jun Engr U S Engrs Office New York City
- Child, John T *CE* '12.....1940 Oxford St Rochester N Y
- San Engr Bur Mun Res 25 Main St
- Chirlian, Gustave *CE* '21..913 Longwood Ave New York City
Jun Asst Engr N Y State Hwy Comm Buffalo N Y
- Chieug, Kwai *MCE* '22....493 Myburg Road Shanghai China
- Chiu, Hsieh Chun *MCE* '18....MChES MSSCh Chung-Jen
McClintic-Marshall Constr Co [Chenghsien Chekiang China
Pittsburgh Pa
- Cho, Wen-Yueh *CE* '16.....
- Chobot, Edwin F *CE* '21.....129 Dean St Brooklyn N Y
Instr School of Civil Engrg Ithaca N Y
- Christensen, Eiler M *CE* '21.....Norwich N Y
- McClintic-Marshall Constr Co Carnegie Pa
- Christian, Joseph H *CE* '20.....Millville Pa
- Christie, J. G. Carlisle *CE* '14.....MAWWA Durham N C
Associated with G C White Engineers
- Chuck, Hong-Sun *AB CE* '12..AMASCE Tayeh Hupeh China
Mgr Pac Trading Co Russian Concession Hankow China
- Chuckrow, Charles M *CE* '11.....544 W 145th St N Y C
- Chief Estimator Fred T Ley & Co Inc 19 W 44th St
- Church, Irving P *CE* '73 *MCE* '78.....AASCE 9 South Ave
Prof Appld Mech and Hydr Emeritus C U [Ithaca N Y
- Churchill, John P *BS CE* '01 MASCE 19 Whittelsey Ave E
Chf Engr Hay Fdry & Iron Wks Co Newark N J [Orange NJ
- Cianchini, Louis F *CE* '16.....Coamo P R
- First Lieut U S A San Antonio Tex
- Clapp, Robert V *CE* '20.....4403 St Clair Ave Cleveland O
- Clapp Concrete Engrg Co
- Clark, Arthur E *CE* '02.....MASCE 7 Colden Ave White
[Plains, N Y
- Asst Div Engr Transit Comm 441 E Tremont Ave N Y C
- Clark, Charles *CE* '09.....Nichols N Y
- Kansas City Structural Steel Co Kansas City Kans
- Clark, Charles H *CE* '92..MASCE MAREA 1716 E 81st St
Engr M of W Cleveland Ry Co Cleveland O
- Clark, Lester P *CE* '17....6024 Chabot Road Oakland Calif
Engineer for Standard Oil Co
- Clark, Otho M *CE* '14....1330 Cherokee Road Louisville Ky
Sales Mgr Kosmos Port Cement Co 614 Marion Taylor
Bldg
- Clark, Robert W *CE* '09.....MASCE 11 Woodlawn Terr
Pres Clark Constr Co 168 Grand St [Waterbury Conn
- Clark, Thomas S *CE* '94 MASCE 1436 E 17th St Brooklyn N
Treas & Chf Engr Alphons Custodis Chimney Constr Co [Y
Bennett Bldg New York City
- Clark, William D *CE* '15.....Elks Club Fairmount W Va
By-Prod & Benzol Foreman Domestic Coke Corp
- Clausz, Irving C *CE* '12..MAAE 1484 Westwood Ave Lake-
Engineer H L Carr Contr Cleveland O [wood Ohio
- Clawans, Edward *CE* '17.....32 Rutgers St Newark N J
- Clav, Leon G *CE* '20..4132 St Charles Ave New Orleans La
With Gilbert & Clay Cotton Futures & Exporting
- deClerq, Clarence F *CE* '07 MAAE 5 Hotchkiss St Bingham-
Asst Engr N Y State Hwy Comm 905 Press Bldg [ton N Y
- Cleveland, Lou B *CE* '07....261 Ten Eyck St Watertown N Y
- Clift, William B *CE* '11.....Omaha Neb
- Vice President Omaha Trust Co
- Clunan, Albert Jr *CE* '12 AMASCE 693 Flatbush Ave Bryln
Asst Mngr of Pur J G White Engrg Corp 43 Exch [N Y
Pl New York City
- Cochran, Jerome *BS CE MCE* '07.....1518 Hamilton St
Genl Contr First National Bank Bldg Houston Tex

- Cochran, Thomas F *CE* '20....74 Lenox Ave E Orange N Y
Produce Comm Merchant 290 Washington St N Y C
- Cockroft, Donald G *CE* '21.....Northport N Y
N Y Telephone Co 15 Dey St New York City
- Codas, Alfredo B *AB CE* '12....MAAE Azara 56 Asuncion
[Paraguay]
- Coe, Ira J *CE* '94..MAIMME 67 Santa Clara Ave Oakland
Cons Engr 762 Mills Bldg San Francisco Calif [Calif]
- Coffey, Philip T *CE* '14....229 Newton Ave Astoria 1, I N Y
Captain U S Engrs Camp Humphreys Va
- Cohen, Abraham *CE* '11.....2109 Pitkin Ave Brooklyn N Y
- Cohen, Morris G *CE* '19.....R F D Box 66 Monticello N Y
Draftsman N Y & N J Bridge & Tunnel Comm N Y C
- Cohen, Paul *CE* '15.....569 W 150th St New York City
F E Seelye Cons Engr 101 Park Ave
- Cohen, Samuel *CE* '09.....
- Coit, Charles W *CE* '00..7353 Fauntleroy Ave Seattle Wash
- Collett, Walter J *CE* '15.....1061 E 19th St Brooklyn N Y
1st Lieut U S A Coast Art Fort Samesamesa Honolulu T H
- Collins, A Stuart *CE* '18....717 Lafayette Ave Buffalo N Y
With Lackawanna Bridge Co
- Collins, Charles W *CE* '89.....Greenwich N Y
Special Track Work Engr Lorain Steel Co Johnstown Pa
- Collum, Thad L *CE* '21.....702 S 15th St Corsicana Tex
Instr School Civil Engrg Ithaca N Y
- Colnon, Redmond S *CE* '87....AMASCE 6417 Columbia Ave
Fruin & Colnon Gen Contrs 408 Olive St St Louis Mo
- Colsten, Albert L *CE* '95..AASCE MASTM Brooklyn N Y
Consulting Engineer 1556 73d St
- Coltman, Robert Jr *CE* '06.....1444 West 73d St Chicago Ill
Engr Bridge Dept C R I & P R R
- Comstock, Charles W *CE Met E MCE* '94 *PhD* '98..MASCE
Cons Engr First National Bank Bldg [76 Grant St
Denver Colo]
- Conant, Frederic W *CE* '14....MAAE 14 E Valerio St Santa
Captain U S A 3d Engrs Schofield Bar- [Barbara Calif
racks T H]
- Concepcion, Manuel S *CE* '14.....562 Legadra St Manila P I
Vice-President Philippine National Bank
- Condon, John Jr *CE* '08..1713 Sansonn St Philadelphia Pa
Contr Mgr Turner Constr Co 244 Madison Ave N Y C
- Conger, Alger A *CE* '97 MASCE 13 St Elmo Road Worcester
Hyd Engr New England Power Co 35 Harvard St [Mass
- Conger, Hiram G *CE* '09.....Nutley N J
Clergyman 740 Rush St Chicago Ill
- Conger, Jay Jr *CE* '16.....Groton N Y
With Groton Bridge Works
- Conger, Laurence J *CE* '07.....Groton N Y
President Corona Typewriter Co Inc and Airdry Corp
- Conger, Walter C *CE* '12.....
Mgr Hlghway Dept Trucon Steel Co Youngstown O
- Conklin, William E *CE* '00.....MECNYS Beacon N Y
Gen Mgr So Dutchess Gas & Elec Co and Fishkill Elec Ry
Co Fishkill N Y
- Conkling, Frank E Jr *CE* '22..387 E Main St Patchogue N Y
Grad Student Cornell Univ Ithaca N Y
- Conkling, Leon D *CE* '00 MASCE MSPEE 516 So Grand Ave
Prof & Head *CE* Dept Mont State Coll Bozeman Mont
- Conley, James *CE* '10.....308 E Seneca St Ithaca N Y
Highway Contractor
- Connor, Frederick T *CE* '04....133 Dempster St Evanston Ill
Dist Sales Agt Carbon Steel Co 819 Ry Exch Bldg Chicago
Ill.
- Conover, G Elliot *CE* '21.....Ashbury Park N J
Engrg Dept N Y Tel Co 15 Dey St New York City
- Constans, Frank S *CE* '19.....5485 Cornell Ave Chicago Ill
Engrg Dept Ill Cen Ry Co
- Conway, Herbert H *CE* '11.....Maplewood N J
Engr & Contr 128 Market St Newark N J
- Conwell, Walter I *CE* '11.....969 E State St Ithaca N Y
Asst Prof Hwy Engr School of Civil Engrg Cornell Univ
- Cook, James R *CE* '20..Riverview Place Hastings-on-Hudson
Draftsman Hazen Whipple & Fuller 30 E 42nd St [N Y
New York City]
- Cooman, Carl C *CE* '15.....AMASCE W Webster N Y
Hwy Contr Batavia N Y
- Coons, Paul D *CE* '05.....Riverside Ill
Asst Val Engr C B & Q R R 547 W Jackson Blvd Chicago
Ill
- Cooper, James A Jr *CE* '16.....426 56th St Brooklyn N Y
Engrg Dept N Y Tel Co 15 Dey St New York City
- Cooper, William M Jr *CE* '21....61 West Tenth St N Y C
- Corbet, Clinton L *CE* '15....5638 Blackstone Ave Chicago Ill
- Corbin, Horace *CE* '05....234 Pelton Ave Staten Island N Y
Asst Engr Pier 6 E River New York City
- Cormack, Charles M *CE* '20.....395 Jersey St Buffalo N Y
- Cornell, W Rodney *BS CE* '15..MSPEE 438 No Aurora St
Asst Prof in Applied Mech Sibley School [Ithaca N Y
of Mech Engrg Cornell Univ]
- Corney, Blair S *CE* '22.....213 W 70th St New York City
- Cortina, Cesar *CE* '21.....S P Macoris Santo Domingo
- Corwin, Daniel C *CE* '08....AMASCE Valley Stream N Y
- Cory, Harry T *BEE BCE MCE* '93 *MME MASCE MASME*
Cons Engr Union Bank Bldg Los Angeles Calif
- Cosgrove, Thomas Jr *CE* '09....447 Second St Braddock Pa
da Costa, Oscar M *CE* '16.....Rio de Janeiro
Engr M of W N W Brazil Railway Bauru Sao [Brazil
Paulo Brazil]
- Courtney, John H *CE* '17.....218 Eddy St Ithaca N Y
711 E St Sparrows Pt Md
- Covert, Pitt Jr *CE* '13.....366 C Y Ave Casper Wy
Oil Refining
- Cowan, Lewis A *BCE CE* '05.....Blackmore Apts Bozeman
Civil Engineer Construction Northern Pacific Ry [Mont
- Cownie, Donald L *CE* '17....40 Bidwell Parkway Buffalo N Y
- Cox, Homer F *CE* '97.....MAWWA 115 Wyoming Ave
Supt & Chief Engr Scranton Gas & Water Co Scranton Pa
- Cozzens, Arthur B *CE* '13....MAICP MASMI 255 E 28th St
Assistant Manager Factory Products Corp [Brooklyn N Y
2 Rector St N Y C]
- Craig, Dan S *BS CE* '13 MIES 1169 21st St Des Moines Ia
Sec-Treas Empire Constr Co 203 Flynn Bldg
- Craig, Joseph E *BS CE* '03.....AMASCE 1449 Third Ave
Chief Engr So Clay Mfg Co Chattanooga [Columbus Ga
Tenn]
- Craighead, Samuel J *CE* '22....729 Hill Ave Wilkinsburg Pa
- Crandall, Carl *CE* '12....AMASCE 404 Univ Ave Ithaca N Y
Asst Prof Rwy Engr School of Civil Engrg Cornell Univ
- Crandall, Lynn *CE* '10....MASCE 316 Hector St Ithaca N Y
Water Commissioner for Big Lost River Mackay Idaho
- Crane, Albert S *CE* '91.....MASCE MBOSCE
Vice-Pres J G White Engrg Corp 43 Exchg Place N Y C
- Crane, Frederick W *CE* '19.....980 Hertel Ave Buffalo N Y
Design & Est Dept Lackawanna Bridge Co
- Critchlow, Howard T *CE* '10..AMASCE 577 Rutherford Ave
Hydr Engr Dept of Conservation & Development State
House Trenton N J
- Crofts, Edgar R *CE* '10.....Hanover Conn
Designing Engr Roch Gas & Elec Co Rochester N Y
- Crook, C Earl *CE* '16.....317 So Penn St Wheeling W Va
Structural Engineer J E Moss Iron Works
- Crosette, Murray F *CE* '02.....MAIMME 1136 Emerson St
Cons Engr 507 First Nat Bank Bldg Denver Colo
- Crossman, Ralph S *CE* '11 AMASCE MIES Huntington N Y
Instr Engrg Drawing Univ of Ill Urbana Ill
- Crouch, N Seymour *CE* '90.....127 W 11 St Erie Pa
Cashier Shepherd Engrg Co
- Crusel, Cornelius C *CE* '22....1637 Constantinople St New
[Orleans La]
- Cubler, Edward C *CE* '22....4917 A St Olney Philadelphia Pa
- Cudebec Albert B *CE* '08.....MASCE Paris France
European Mgr Ohio Brass Co 7 rue de Tilsitt
- Cuff, James E *CE* '12....AMASCE MROES Rochester N Y
Lawyer Rochester Savings Bank Bldg
- Culbertson, William J *CE* '15.....211 Sheriff St Paris Ill
Cnstr Dept Holly Sugar Corp Boston Bldg Denver Colo
- Cummin, Gaylord C *CE* '04..AMASCE MAWWA 31 Belle-
Cons Engr Inst for Pub Service 1125 [vne Ave Dayton O
Amsterdam Ave New York City]
- Cummin, Hart *CE* '09..AMASCE 31 Bellevue Ave Dayton O
Invgt Staff Engr K C Pub Serv Inst Kansas City Mo
- Cummings, Edward *CE* '17..2877 Briggs Ave New York City
Ward Motor Vehicle Co Mount Vernon N Y
- Cummings, Elmore D *CE* '80....MASCE 4608 15th St N W
U S Asst Engr Off Chief of Engrs 20th & B Stas [Wash DC]
- Cummings, Noah *CE* '94....AMASCE 457 Dunham Ave Mt
Asst Engineer Dept Plant and Structures [Vernon N Y
Municipal Bldg N Y C]
- Curry, Albert *CE* '02.....Woodland Road Pittsburgh Pa
Real Estate, 1507 First National Bank Bldg
- Curry, Lynn B *CE* '13....MAAE Box 153 Mecklenburg N Y
Civil Engr with Gannett Seelye & Fleming Harrisburg Pa
- Curtis, Charles E *CE* '85..MASCE 111 Quarry St Ithaca N Y
Supt Bldgs and Grounds Cornell Univ
- Curtis, Charles W *CE* '88 *LLB*..17 Melrose St Rochester N Y
Statistician Sill Stove Works 524 Oak St
- Curtis, George D *BS CE* '09....1804 Jetton Ave Tampa Fla
Mgr The Morris Plan Bank of Tampa
- Curtis, Gram *CE* '72.....323 No Jefferson St New Castle Pa
Mech Engr & Desir New Castle Works Carnegie Steel Co
- Curtiss, R Elmer *CE* '04.....41 Sumner St Hartford Conn
Contractor and Civil Engineer 721 Main St
- Custer, Lewis B *CE* '07.....57 North St Mt Vernon N Y
Bond Salesman Guaranty Co 140 Broadway N Y C
- Daddysman, Reginald A *CE* '22 1121 E Main St Medford Ore
- Dahmen, Ernest A *CE* '06.....113 Ferris Place Ithaca N Y
County Asst Engr Tompkins Co N Y State Highway Comm

- Dailey, Bernard C CE '17....600 W 192d St New York City
First Lieut C A C Fort Mills Manila P I
- Daley, DeWitt H CE '06.....Chatham N Y
Sen Asst Engr Barge Canal Off Albany N Y
- Dalton, Douglas A CE '14.....Riverside Conn
- Daly, John W CE '12....AMASCE 238 Mayflower Ave New
Assistant Engineer Transit Constr Comm [Rochelle N Y
Brooklyn N Y
- Daly, Walter P CE '16.....612 Washington St Olean N Y
Engineer 1212 Otis Bldg Philadelphia Pa
- Danforth, Thomas F CE '15..364 Norwood Ave Buffalo N Y
John W. Danforth Co 70-72 Ellicott St
- Daniels, Francis W CE '21.....Gilbertsville N Y
With Contr 227 Rockwell St Norwich Conn
- Daniels, Percy N CE '15....602 Stuyvesant Ave Trenton N J
Sanitary Engineer State Dept of Health
- Danis, Benjamin G CE '09.....930 Chester Ave Dayton O
Pres Danis-Hunt Constr Co Contrs 908 Schwind Bldg
- Dann, Alexander W CE '07 AMASCE Sycamore St Haysville
Vice-Pres & Treas Keystone Sand & Supply Co [Pa
Pittsburgh Pa
- Darrow, Henry D CE '07.....153 Pearl St Kingston N Y
Assistant Engr N Y State Highway Comm Div No. 1
- Darrow, Marius S CE '09.....AMASCE Kingston N Y
Manager Barber Asphalt Paving Co Madison Ill
- Darrow, Warren E CE '07.....118 Boyce Ave Utica N Y
U S Engrs Off Old Land Off Bldg Washington D C
- Darrow, Wilton J CE '09.....MASCE Lakewood N Y
Oceanside Calif
- Darville, Merton A CE '12.....162 25th St Elmhurst N Y
Off Mgr Constr Dept Turner Constr Co 244 Madison Ave
N Y C
- Daudt, Ralph B AB '07 CE '10..AMASCE MTSE Toledo O
Chief Engr A Bentley & Sons Co 2629 Robinwood Ave
- Davenport, Ward P CE '93.....40 Church St Plymouth Pa
Supt Spring Brook Water Supply Co 114 W Main St
- Davidson, Clarence H CE '11...84 Monmouth St Springfield
Designing Engineer Bureau Public Works [Mass
Manila P I
- Davis, Carl E CE '91..MemECI 1369 Madison Ave Memphis
Hydr Memphis Artesian Water Dept [Tenn
- Davis, Charles S CE '89....MAREA MASCE 306 Broad St
Cons Engr 802 Century Bldg Pittsburgh Pa [Sewickley Pa
- Davis, Donald G CE '17.....8 Noyes St Utica N Y
Asst Supvr E I du Pont Co Penns Grove N J
- Davis, E. Russell CE '13..MAAE MASM Westover Apts
Office-Engr City Hall Newport News Va
- Davis, George J Jr CE '02..AMASCE Pinhurst Tuscaloosa
Dean & Prof Civil Engrg University of Ala [Ala
University Ala
- Davis, John C CE '00.....AMASCE 486 Stratford Court
Staff Engr Citizen's Bur 425 Water St [Shorewood Wis
Milwaukee Wis
- Davis, Lynn L CE '96 MASCE 32 University Ave Buffalo N Y
Prin Asst Engr U S Army Engrs Off 540 Federal Bldg
- Davis, Meyer CE '08.....MASCE 152 W 118 St N Y C
Engr & Contr 217 Broadway
- Davis, R Menees CE '07..AMEL 36 Oucens Rd Oucens N Y
Statistical Editor *Electrical World* New York City
- Davis, Roland P SB MCE '08 PhD '14..MAREA MASCE
Prof Str & Hyd Engr W Va Univ & [Morgantown W Va
Cons Br Engr State Rd Comm
- Dawson, Francis M BS in CE MCE '13....AMEIC MASTM
Assoc Prof Hydr Engrg Univ of [Truro Nova Scotia
Kansas Lawrence Kans
- Dav, Harold CE '20.....Mexico N Y
67 No Franklin St Pottstown Pa
- Dav, Warren E CE '10.....Oakdale Stanislaus Co Calif
Res Engr Phoenix Utility Co Nesquehoning Pa
- Deagon, Arthur CE '21.....190 Randall Ave Freeport N Y
- Dean, George W BS CE '04.....
- DeCarre, Octave CE '11..3522 13th St N W Washington D C
Major U S A C A C Fort Monroe Va
- Decker, A. Clinton CE '09..MAPubIIA MAWWA 759 Park-
San Engr Tenn Coal Iron & R R Co [Way Fairfield Ala
Birmingham Ala
- Degling, Albert O CE '20.....195 N 15th St E Orange N J
Asst Turner Constr Co of N Y Peters Bldg Williamsport
Pa
- DeGolyer, Calvin S CE '10....Table Rock Farm Castile N Y
Farmer
- Dehnff, Wilmer A CE '10.....203 E 32 St Baltimore Md
Principal Baltimore Polytechnic Inst
- DeLano, Harry C CE '95.....MASCE Canastota N Y
- Delaney, Francis M CE '22.....704 Fifth St Watervliet N Y
- Delaney, Lewis H CE '12.....JASCE Flint Mich
- Demarest, John McL CE '14..584 W 152d St New York City
Res Engr Dexter Folder Co Pearl River N Y
- Dennett, Robert C CE '04..AMASCE 40 Third Pl Brooklyn
Off Engr Nat Board Fire Underwriters 76 [N Y
William St N Y C
- Dennis, Harry W CE '99....MASCE 871 No Kenmore Ave
Constr Engr So Cal Edison Co Edison Bldg Los Angeles
Cal
- Dennis, Olive W CE '20....1021 Madison Ave Baltimore Md
Drafts Bridge Engrg Dept B & O RR
- Denniston, Jesse H CE '09.....Cornwall N Y
Engr Storm King Hwy N Y State Hwy Dept
- Devin, George CE '73.....MASCE Los Angeles Calif
- DeWitt, John CE '17....Broadmore Colorado Springs Colo
- Diamant, Albert CE '09..AMASCE 2 Marble Hill Ave N Y C
- Dickens, Wayland CE '09.....Alpine N Y
Asst Engr N Y C Board of Water Supply Gilboa N Y
- Dickinson, J Haines CE '90.....Montclair N J
Mgr & Chf Engr Logging Dept Lidgerwood Mfg Co 96
Liberty St N Y C
- Dickinson, William E CE '14.....
133 Federal Bldg Salt Lake City Utah
- Diefendorf, Charles W CE '08..203 W Borden Ave Syracuse
120 W Jefferson St [N Y
- Dillard, William R CE '17...302 E Main St Washington Ga
Engr Converse Bridge & Steel Co Chattanooga Tenn
- Dillenbeck, Arvin J CE '11....AMASCE 50 Wellington Road
Asst Engr Lupfer & Remick 50 Deseronto Ave Buffalo N Y
- Dillenbeck, Clark CE '88..MASCE MECIPh 209 Pelham Rd
Asst Chief Engr P & R Ry Co 522 [Germantown Pa
Reading Term Philadelphia Pa
- Dimijian, Aran H CE '18.....Ithaca N Y
Kilby Camp Constr Montgomery Ala
- Dimon, Daniel Y CE '96..MASCE RFD 243 Riverhead N Y
Power Specialty Co 111 Broadway New York City
- Dingle, James H BA CE '92.....MASCE 182 Tradd St
City Engineer Charleston S C
- Dinnerstein, Nathan CE '17 1911a Atlantic Ave Brooklyn N Y
- Distler, Walter G CE '13..2905 No Calvert St Baltimore Md
Baltimore Manager Geo A Fuller Co American Bldg
- Dittmar, Albert L CE '19....916 Eric Ave Williamsport Pa
State Hwy Inspector 224 No Broad St Jersey Shore Pa
- Dittrich, John A CE '14.....2555 Grand Concourse N Y C
Sales Engr Blaw-Knox Co 165 Broadway
- Dixon, DeForest H CE '96..AMASCE East Shore Rd Great
Vice Pres Turner Constr Co 244 Madison [Neck N Y
Ave N Y C
- Dockstader, Simeon E CE '10.....No Tonawanda N Y
Superintendent Engineer American District Signal Co
- Dodge, J Lynn CE '94..MAAE MASCE 253 Lake Ave Pit-
Exec Asst & Sales Repr U S Shipping Board [man NJ
Hog Island Pa
- Dodgson, Frank L CE '89.....MAREA Rochester N Y
Consulting Engineer General Railway Signal Co
- Dodson, Richard S BS CE '08 c/o Adj Gen of Army Wash-
Major C A C U S A Fort Mills P I [ington D C
- Doebler, Errol W CE '15 Box 611 Sea Cliff N Y
Asst Engr Hazen Whipple & Fuller 30 E 42d St N Y C
- Dole, Walter S CE '92 MAGasI 616 Fourth St Riverside Calif
Gas Engr Fed Lt & Trac Co 52 William St New York City
- Dominguez, Rafael CE '04....MASCE Rio de Janeiro Brazil
c/o Anglo-Mexican Petroleum Co Ltd Box 252
- Donnellan, George P CE '10 10 Stratford Park Rochester N Y
Engr Brazos River Oil Corp 520 1/2 Spring St Shreveport La
- Doores, William R CE '93.....MNGS
Col U S A Coast Art Fort Adams Newport R I
- Dornbach, Earle E R CE '15 108 W Main St Mechanicsburg Pa
- Dorsey, John G CE '16....1059 Washington St Detroit Mich
- Dougherty, Nathan W BS in CE CE '13 MCE '14....MAAE
Head Professor Civil Engrg MASCE MSPIEE MAAAE
Univ of Tenn Knoxville Tenn
- Douglas, Damon G CE '21.....58 E 96th St New York City
Asst Supt Turner Constr Co of N Y C 12 No Orange Ave
Orlando Fla
- Douglas, P Gordon CE '06.....Hamadan Persia
Imperial Bank of Persia
- Dow, Hezekiah S CE '15....JASCE 312 Lee St Evanston Ill
Field Engr Chicago Union Station Co Chicago Ill
- Dowling, Joseph L CE '89..217 3rd Ross Ave Houston Tex
Vice-President The Texas Pipeline Co
- Downey, Archibald S CE '96.....MASCE MPNWSE The
Mem of Firm A W Quist & Co Genl Contrs [Highlands
Hoge Bldg Seattle Wash
- Dovle, Hobert E CE '12.....916 Park Ave Richmond Va
Supt Geo A. Fuller Co 402 Sweetland Bldg Cleveland Ohio
- Drake, Archibald E CE '07...490 Huron Ave Cambridge Mass
Supr N E Travelers Ins Co 141 Milk St Boston Mass
- Dransfield, Thomas Jr AB CE '10 12 Russell St Malden Mass
Engr Str Dept Stone & Webster Inc 147 Milk St Boston
Mass
- Drennen, Everett CE '08 MAIME MNatCoalAssn MRRCI of
President W Va Coal & Coke Co Elkins W Va [N Y
- Driscoll, James F CE '17.....105 College Ave Ithaca N Y
c/o Concrete Steel Co 524 Guardian Bldg Cleveland O

- Duba, John Jr CE '15...MAAE 17 Stratford Apts Norfolk Va
C E Aide Public Works Off Navy Yd
- Dubuis, John BA CE '09.....104 Wheelon Annex Apts
Civ & Hydr Engr 500 Journal Bldg Portland Ore
- Ducasse, Vidal CE '20.....8 Carlos 111 Havana Cuba
- Duckham, Albert E CE '90...MESWPa 246 So Rebecca St
Cons Civil Engr 64 Vandergrift Bldg Pittsburgh Pa
- Dudley, Harold J CE '22.....15 Park Pl Silver Creek N Y
- Duffies, Edward J CE '88...MAAE MASCE Washington D C
U S Asst Engr Rivers & Harbors Div Off Chief of Engrs
War Dept
- Duffies, Edward L CE '21...2412 12th St NE Washington D C
Engr Concrete Steel Co Woodward Bldg
- Duncan, Daniel T CE '18.....Ninety Six S C
Ensign U S N R F U S S Henderson
- Dunham, Walter H CE '94....187 Maryland St Buffalo N Y
Chief Engr C F Ernst Sons Iron Works 75 Lathrop St
- Dunlap, Arthur H BS of CE CE '99...AMASCE Barstow Tex
c/o Board of Water Engrs Austin Tex
- Dunn, Albert C CE '14...MAAE 1725 Park Ave Richmond Va
Highway Engr Bur Pub Roads Box 415
- Dunn, Frank S CE '92....MAGasA MSEENY Albany N Y
Supt Gas Dept Mun Gas Co 124 State St
- DuPré, Wallace D AB AM CE '13.....233 N Church St
Manager Ford Agency Spartansburg S C
- Durkan, William J CE '06 158 Flower Ave E Watertown N Y
- Duryea, Edwin Jr CE '83...MASCE 318 Lincoln Ave Palo
Civil & Cons Engr 1318 Humboldt Bank [Alto Calif
Bldg San Francisco Calif
- Duschak, Ernest A CE '06....231 Durand St Sarnia Ont Can
Engineering Department Imperial Oil Co
- Dyson, James CE '78...MAIME 1437 Reese St Silverton Colo
Civil and Mining Engineer U S Mineral Surveyor
- Earl, Mark A BS MCE '94.....Muskogee Okla
Consulting Engineer
- Eddy, Allerton CE '21.....Canaan Conn
Eq Dept Durant Motor Co Long Island City N Y
- Edge, Alfred J CE '06.....c/o W S Edge Westfield N J
Asst Mgr U S Rubber Pltn Medan Sumatra D E I
- Edge, Walter S CE '03...MACI 122 N Euclid Ave Westfield
Chief Engr Concrete Steel Co 42 Broadway N Y C [N J
- Edmunds, Robert C CE '18....617 E 16th Ave Denver Colo
Goodrich Rubber Co Akron O
- Edwards, Elmer G CE '12...3341 Bryant Ave S Minneapolis
Hwy Engr U S Bur Pub Rds 410 Hamm Bldg [Minn
St Paul Minn
- Edwards, James H CE '88.....MASCE Passaic N J
Asst Chief Engr American Bridge Co 30 Church St NYC
- Edwards, Latta V BE CE '11.....AMASCE MAAE
Cons Engr Box 60 Winston-Salem N C
- Edwards, Llewellyn H CE '15...432 Grand St Susquehanna Pa
Maintenance Inspector Eric RR
- Edwards, Robert F CE '17....480 Mansfield Pl Brooklyn N Y
Assistant Engineer U S Geol Survey Helena Mont
- Egbert, J Byron CE '07.....MAAE Peekskill N Y
County Asst Westchester Co N Y State Hwy Comm
- Egeberg, Hans O CE '00.....712 Jackson St Gary Ind
Supt Labor Illinois Steel Co Gary Works
- Ehle, Boyd CE '86.....MASCE East Creek N Y
- Ehlers, Joseph H MCE '16....151 Seymour St Hartford Conn
Prof Structural Engr Pei Yang Univ Tientsin China
- Ehlers, Victor M BS CE '10 TexWWA MAPubHA LaGrange
State San Engr Capitol Station Austin Tex [Tex
- Ehrlich, Arthur C CE '14....15 W 107th St New York City
Chief Engr American Tobacco Co 111 Fifth Ave
- Eickelberg, Ernest W CE '13...AMASCE 1215 Parkwood Dr
Hydro and Geod Engr USC&GS [Cleveland O
Washington D C
- Eidlitz, Otto M CE '81....MASCE MASTM 787 Fifth Ave
Pres Marc Eidlitz & Son 41 E 42d St New York City
- Eilenberger, Charles F CE '16 58 Grand Ave Middletown N Y
- Eisenbrandt, Alexander S CE '20...Ridge Rd Mt Washington
[Baltimore Md
- Eisenbrandt, Frederick H CE '18 Ridge Rd Mt Washington
Assistant Engineer Dent of Sewers [Baltimore Md
- Eisner, Benjamin CE '20....700 So Broad St Trenton N J
- Elkind, Isadore J CE '13....117 Saratoga Ave Yonkers N Y
Asst Manager S Blickman 199 Lafayette St N Y C
- Elliott, John E AB CE '05.....MECIT 1530 Riverside Ave
Plant Engr Trenton Plant Am Bridge Co Trenton N J
- Ellis, Albert R CE '05.....6339 Marchand St Pittsburgh Pa
Genl Mgr Pittsburgh Testing Laboratories
- Ellis, Douglas MCE '20.....209 Albert St Kingston Ont Can
- Ellis, Guernsey W CE '04....MAAE 3 Olive Pl Hornell N Y
Asst Engr N Y State Highway Department
- Ellis, Lawrence R CE '04....5230 21st St NE Seattle Wash
Secretary Rogers Myroie Lumber Co
- Ellsworth, Goodwin D Jr CE '10...1248 Girard St NW Wash
G. D. Ellsworth Co Contrg Engrs 412 U S Nat Bank [D C
Bldg Portland Ore
- Elting, Oscar R CE '14.....AMASCE New Paltz N Y
Asst Engr Bureau of Water Supply Akron O
- Elton, Richard L CE '12...AMASCE 3330 Tracy Ave Kansas
Mgr Bldrs Material Supply 309 Republic Bldg [City Mo
- Elwood, Frank E CE '06.....Gouverneur N Y
Business Taber Alberta Can
- Ely, G Wells CE MCE '11.....190 Wachworth Ave N Y C
- Emmert, Luther D CE '11....1704 Hinman Ave Evanston Ill
Repr Buffalo Forge Co 562 W Washington Blvd Chicago Ill
- Engel, Arthur W CE '09.....333 Thorn St Sewickley Pa
Str Designer Am Br Co 1420 Frick Bldg Pittsburgh Pa
- Engel, Joseph S CE '20.....615 Quiney St Brooklyn N Y
- Engel, Francis J CE '10.....2000 32d Ave So Seattle Wash
Asst Engr Great Northern Ry
- Eppleur, Charles Jr CE '17....266 E 162d St New York City
Salesman Export Dept Consolidated Steel Corp 25 Brdwy
- Erickson, Charles E CE '10.....1616 East Howell St
Contracting & Lumber 317 Hoge Bldg Annex Seattle Wash
- Erisman, Henry L CE '92.....St Louis Mo
R of W Appraiser St L & S F Ry Co 631 Frisco Bldg
- Etnyre, Samuel L CE '88....MIAES MAWWA 303 2nd St
Superintendent Water Works Co Council Bluffs Ia
- Evans, Edward A CE '06....511 W 143d St New York City
Res Engr Catawba Mfg & Electric Pow Co Mount Holly NC
- Evans, Thomas B CE '22.....Church View Va
- Evans, William II CE '22.....415 Turin St Rome N Y
- Evans, William II CE '15 2321 West End Ave Nashville Tenn
Civil Engr Standard Oil Co of La 1206 Whitney Cent Bldg
N Orleans La
- Eyrich, Harold R CE '14.....Phoenixville Pa
- Fahey, Aloysius A CE '14.....Eastport Me
- Fahy, Charles II CE '17....21 Arnold Park Rochester N Y
- Fairbanks, Herbert S CE '10....2041 E 32d St Baltimore Md
Sen Hwy Engr Bur Pub Roads Dept of Agr Wash D C
- Fancher, Archie J CE '11....2203 Ditmar Ave Brooklyn N Y
Telephone Engineer N Y Tel Co 81 Willoughby St
- Farlin, Charles D CE '13....168 Drake Ave W New Brighton
Engineer 200 Edgewater St Staten Island N Y [N Y
- Farmer, William F CE '76....126 Amherst St Nashua N H
Retired
- Farr, Newton C CE '09....4737 Woodlawn Ave Chicago Ill
Real Estate 140 So Dearborn St
- Farrington, William S CE '88.....Buffalo N Y
Pres & Treas Genl Flour & Feed Co Chamber of Commerce
- Fassett, Newton C CE '04.....150 Lake St Elmira N Y
Elmira Rep Hemphill Noyes & Co of N Y C
- Fancher, Cyril A CE '10....268 Alexander St Rochester N Y
Supt of Constr Turner Constr Co 244 Madison Ave NYC
- Faustman, William F CE '07....MAAE 423 22d St Sacra-
Civil Engineer Calif State Hwy Comm [Imento Calif
- Fav, Alfred L CE '20.....Longmeadow Mass
Draftsman Hool & Johnson Cons Engrs 445 Milwaukee St
Milwaukee Wis
- Fay, Arthur T CE '12.....Cooperstown N Y
Asst Constr Engr Smet-Solvay Co Buffalo N Y
- Fear, Holbert W CE '13....M Bos Soc CE 31 Chestnut St
Mem Firm Fear & White Glove Mfrs [Gloversville N Y
- Feehan, Harry J CE '14.....807 E State St Ithaca N Y
Truscon Steel Co 58 Lafayette Blvd Detroit Mich
- Fein, Paul CE '17.....1014 Eastern Pky Brooklyn N Y
- Feiner, Mark A CE '13....3143 Broadway New York City
With P Feiner 335 W 44th St
- Feinson, Samuel H CE '22...295 Throop Ave Brooklyn N Y
- Feldman, Louis CE '16.....883 Longwood Ave N Y C
- Felknor, James M AB CE '09....R D No 3 Morristown Tenn
Assistant Engineer Colusa Calif
- Fellman, Morris CE '09.....140 W 69th St N Y C
Designer & Engineer S M I Engrg Co 15 E 40th St
- Ferguson, George A CE '01....628 Eleventh Ave No Seattle
Mem Firm McHugh Constr Co 517 3d Ave No [Wash
- Ferguson, Oscar W CE '75.....
Hydrographic & Geodetic Engr USC&GS Wash D C
- Fernandez, Francisco J CE '17....Box 518 Cienfuegos Cuba
- Fernow, Ross R CE '02.....
Cons Engr 1524 Chestnut St Philadelphia Pa
- Ferrer, Francisco J CE '17.....Concejal Veiga 18 Vibora
[Havana Cuba
- Ferris, George F CE '81.....Sierra Madre Calif
- Ferris, Ralph J CE '07.....Linesville Pa
Engr in Chg Pymatuning Res
- Fertel, Arthur CE '21.....303 Hooper St Brooklyn N Y
Asst Engr N Y State Hwy Comm Hornell N Y
- Field, Arthur M CE '14.....AMASCE 61 Nunda Blvd
Hopkins & Field Cons Engrs 349 Cutler Bldg Rochester N Y
- Fields, Frank V CE '18....21 Serrell Ave Binghamton N Y
Engineer State Road Dept Tallahassee Fla
- Filby, Ellsworth L CE '17.....MAPubHA 1319 Bull St
State San Engr State Board of Health Columbia S C

- Filkins, Claude W I, CE '93 MCE '94..MAAE 1701 Madison Civil Engr 1204 Franklin Bank Bldg [Ave Scranton Pa Philadelphia Pa
- Finch, Burtis J CE '07.....MAAE 416 28 St Ogden Utah Dist Eng U S Bur of Pub Rds Dist No 12
- Finch, Jerry C CE '02.....827 Lancaster St Albany N Y Secretary N Y State Highway Comm
- Finkelburg, Elliot A CE '15.....R D 1 Missoula Mont Chief Hydrographer Minidoka Irrigation Dist Rupert Ida
- Finkelstein, Nathan R BS CE '11.....157 W 79th St N Y C Secy & Treas Sam Finkelstein & Co Inc 801 Broadway
- Finley, George I CE '00.....104 E End Ave Pittsburgh Pa Civil Engr 806 Phipps Power Bldg
- Finn, Thomas D Jr CE '22.....19 Gill St Exeter N H Standard Oil Co New York City
- Firth, Elmer W CE '95 AM PhD.....AMASCE 1 John St Asst Engr in charge Maint Bur Sewers [Jamaica N Y Bor of Queens New York City
- Fischer, Nemo M CE '12.....21st St Flushing L I N Y Sales Manager Mulford Haas Co Brooklyn N Y
- Fish, John C I CE '98..MASCE MAREA 308 Lincoln Ave Prof Railroad Engrg Stanford Univ Palo Alto Calif
- Fisher, Clarence F CE '09..3327 Clarendon Rd Cleveland Hts 5716 Euclid Ave Cleveland O
- Fisher, Frederick W CE '03..MASCE MROES Fairport N Y Adjuster Employment & Safety Mgr Roch Gas & Elect Corp
- Fisher, Harold S CE '20.....499 Plymouth Ave Buffalo N Y Teacher Mech Drawing Buff Tech High School
- Fisher, John E CE '18.....308 W Seneca St Ithaca N Y
- Fisher, Wager CE '99.....AMASCE Bryn Mawr Pa Cons Engr Otis Bldg Philadelphia Pa
- Fitch, Charles W CE '10..c/o Southern Ry Washington D C
- Fitch, Squire E CE '00.....42 Academy St Westfield N Y Sen Asst Engr N Y State Hwy Dept Buffalo N Y
- Fitzgerald, James W CE '18.....James St Clayton N Y Cashier Nat Exchange Bank
- Fitzgerald, John M CE '09.....MARYB&BA Fillmore N Y Roadmaster Cent of Ga Ry Room 209 Term Sta Macon Ga
- Fitzpatrick, Frank T CE '15.....432 W 51st St N Y C Jun Asst N Y State Public Service Comm
- Fitzpatrick, Paul E CE '21.....2037 Seneca St Buffalo N Y Building Construction
- Fitz-Randolph, W S CE '05.....Sloatsburg N Y Bldr & Contr 1328 Broadway New York City
- Flanigan, Horace C CE '12..Quaker Ridge New Rochelle N Y
- Fleming, Thomas Jr BS CE '05..MASCE 5225 Pembroke Pl c/o Oil Well Supply Co Pittsburgh Pa
- Fleming, Thomas J CE '13.....29 Beacon St Waterbury Conn
- Flynn, Walter F J CE '12.....151 W 42d St New York City
- Foard, Arthur V CE '06.....1602 Linden Ave Baltimore Asst Supt Md Dredging & Contracting Co
- Follansbee, Robert CE '02.....MASCE Denver Colo Dist Engr U S G S 403 New P O Bldg
- Foot, Benjamin F AB '13 CE '16 831 Holland Ave Wilkins-c/o Pittsburgh-Des Moines Steel Co Pittsburgh Pa
- Ford, Robert G CE '07.....Bellwood Pa Supervisor Penn R R
- Forrest, George M BS CE '02..MASME 704 Paximosa Ave General Supt Ingersoll Rand Co Phillipsburg [Easton Pa N J
- Forster, Clarence E CE '15.....558 Crescent Ave Buffalo N Y Asst Engr Natl Aniline & Chem Co
- Fort, Edwin J CE MCE '94.....MASCE MASTM MASMI City Manager Niagara Falls N Y
- Fortier, Ernest C CE '18..615 E Walnut St Pasadena Calif Res Engr State Land Board Delhi Calif
- Foster, Frank G CE '10.....12 St James St Newton Mass Engr Fred T Ley & Co Inc 19 W 44th St N Y C
- Foster, Henry A BS CE '16.....AMASCE 205 Garfield Place Asst Engr N Y Water Pow Investigations [So Orange N J 84 Pine St N Y C
- Foster, Thomas M CE '04..5659 Rosemary Pl N Orleans La Asst Secy Louisiana Fire Prevention Bur 438 Baronne St
- Foster, Willard S CE '19.....JASCE 161 Ridge Road Rutherford N J
- Fountain, Thomas L BS in CE '05..MASCE College Sta Tex Hyd & San Engr Moseley & Fountain Cotton Exch Bldg Dallas Tex
- Fowler, Charles H CE '14.....Little Falls N Y Sales Engr Truscon Steel Co Pittsburgh Pa
- Fowler, George CE '14.....9 Durycia Pl Hempstead N Y Organist & Choirmaster St Chrysostom's Chapel Trinity Parish 550 Seventh Ave New York City
- Fox, A Manuel CE '11..MASS 431 Van Cortlandt & Park Lecturer Sch Bus & Civic Admn Coll [Ave Yonkers N Y City of N Y New York City
- Fox, Charles J CE '11.....Ellicottville N Y
- Fox, Robert I CE '09..AMASCE 126 State St Batavia N Y City Engineer Bethlehem Pa
- Frank, Alfred CE '98.....Alta Club Salt Lake City Utah Pres & Genl Mgr of Various Mining Cos 626 Newhouse Bldg
- Frank, George S CE '11.....AMASCE Laurel Hill N Y Mgr of Purchases Cornell Univ Ithaca N Y
- Frank, Harry H CE '12 AMASCE 753 Mellon St Pittsburgh Supt of Constr The Hunting-Davis Co [Pa
- Frank, Leslie C CE '13.....AMASCE MACHS Dallas Tex Vice-Pres Tennessee Dairies Inc Dallas Tex
- Fraser, Edwin A CE '10.....607 Rugby Rd Brooklyn N Y Sales Engr 105 W 40th St N Y C
- Freeman, Herman M CE '93..14-16 Northfield Ave W Orange Freeman & Winston Cons Engrs [N J
- Freeman, William B BCE CE '05.....AMASCE 160 Franklin Cons Engr & Br Mngr Lock Joint Pipe Co [St Denver Colo 311 Engrs Bldg
- French, James B CE '85..MASCE 75 Alsop St Jamaica N Y Consulting Engineer 50 Church St New York City
- Freyre, Leopold E AB CE '10.....MCUSE 12th St Vedado Civil Engr Central Jaronu Camaguey Cuba [Havana C
- Fried, Isador CE '10.....Bridgeport Conn
- Friedenberg, Benjamin CE '17..JASCE 86 Amboy St Brook-lydno & Geod Engr USC&GS Washington D C [lyn N Y
- Friese, Edwin CE '09.....Catonsville Md Res Engr State Rd Comm 601 Garrett Bldg Baltimore Md
- Fritz, Eduard Jr CE '20.....254 Main St Poughkeepsie N Y Asst Engr Pa Public Service Corp Johnstown Pa
- Fritz, William H Jr CE '16.....Berwyn Pa Lumber Business 1420 Chestnut St Philadelphia Pa
- Frosch, Albert E CE '09.....134 Stamm Ave Pittsburgh Pa Mgr Ohio River Gravel Co Wheeling W Va
- Frost, Charles P CE '16 16 Hammersly Ave Poughkeepsie NY With E V Anderson Genl Contr
- Fruto, Antonio E de M CE '77.....Ceara Brazil Professor of Mathematics
- Fruchtbach, Jacob CE '17....783 Irving Ave Syracuse N Y Sales Engr Truscon Steel Co 440 Gurney Bldg
- Fuchs, Abraham W CE '13....520 Jerome St Brooklyn N Y San Engr U S Pub Health Service Memphis Tenn
- Fuchs, John Jacob CE '17....334 E 17th St New York City Sales Engineer Cham of Comm Bldg New Haven Conn
- Fuertes, James H CE '81.....MAICONS E MASCE MEIC Hydr & San Engr 140 Nassau St N Y C [MAWWA
- Fuller, Almon H MCE '98.....MASCE 722 Douglas Ave Prof Civil Engrg Iowa State Coll Ames Ia
- Fuller, Avery E CE '22.....Holley N Y J G White Mngmt Corp Oneonta N Y
- Fuller, Weston E CE '00.....MASCE MNEWWA Hazen Whipple & Fuller Cons Engrs 30 E 42d St N Y C
- Fulton, Daniel F CE '03.....33 Morsemere Pl Yonkers N Y Office Manager Ingersoll Rand Co New York City
- Fulton, William J CE '12.....c/o R E Taylor Fortuna N D
- Gaffin, William W CE '96.....MWSE Fond du Lac Wis Gaffin & Gehri Contrs 270 Sheboygan St
- Gage, Lloyd G CE '02.....1204 W Woolman St Butte Mont Mining Engr Anaconda Copper Mining Co
- Gallagher, Joseph CE '07..4119 Westminster Pl St Louis Mo Asst Engr M & O R R 1201 Fullerton Bldg
- Gantz, Maurice A CE '13.....R D 2 Troy O City Engineer
- Garbi, Louis CE '07..AEIC 5 Lincoln Ave Montreal PQ Can Gen Mgr Scottish Can Magnesite Co Ltd 705 McGill Bldg
- Garfinkel, Harry CE '22.....836 Myrtle Ave Brooklyn N Y
- Garnezy, Samuel CE '13.....1382 Prospect Ave N Y C Estmr and Desnr Atlantic Gulf & Pacific Co Manila P I
- Garrabrant, Robert B CE '22.....998 Broad St Bloomfield N J
- Garrett, Robert P CE '97..MASCE MECStl, 6234 Wash Ave Vice Pres Mo Br & Iron Co 1000 Fullerton Bldg St Louis Mo
- Garrett, Seymour S CE '04....115 Oak Hill Rd Ithaca N Y Prof Sibley School of M E Cornell Univ
- Garrido, José CE '14.....55 Alejandro VI Manila P I Supt Building Construction & Inspection City Hall
- Gastmeyer, Robert W CE '11..132 Barclay St Flushing N Y Asst Chief Engr Brewster & Co Long Island City N Y
- Gatslick, Samuel L CE '11.....North Adams Mass
- Gavett, Weston CE '11 MCE '12.....MAWWA MNEWWA With Clyde Potts 30 Church St N Y C [Plainfield N J
- Gebhard, John C CE '19 JASCE 219 E 18th St New York City Lieut CEC USN Christianstad St Croix Virgin Islands
- Gehring, Edwin W CE '00 MAMEDA MAAS MACollPhysns Physician 131 State St Portland Me
- Gehring, Herbert A CE '03.....MAAAS MAPubHA Morris Knowles Inc Hippodrome Bldg Cleveland O
- Geibel, Edward M CE '16 144 Millbank Ave Greenwich Conn Lubricating Oil Dept Socony Tientsin China
- Gelder, Walter H CE '98 704 E Montgomery Ave Ashland Ky Engineer Ashland Coal & Iron Ry Co

- Gelser, Charles S *CE* '03.....Dalton N Y
 Consulting Engineer
 George, Edward *CE* '75.....Nassau N P Bahamas B W I
 Merchant
 George, Henry H 3d *AB CE* '12..1831 Monument Ave Rich-
 [mond Va
 George, Sidney G *CE* '05..MSPEE 118 Falls St Ithaca N Y
 Prof Mechanics School of Civil Engrg Cornell Univ
 Gerwig, Walter H *CE* '05....131 13th St Parkersburg W Va
 Secy Bentley & Gerwig Furniture Co
 Getman, Frank L *CE* '99.....MASCE Lyons N Y
 Pres & Genl Mgr Cuban Importing Co Lonja del Comercio
 518 Havana Cuba
 Gibb, Walton *CE* '09.....4650 Locust St Philadelphia Pa
 Manufacturer 313 Vine St
 Gibbs, J. Lynn *CE* '10.....1004 Decatur St Watkins N Y
 Asst Engr N Y State Hwy Comm Hornell N Y
 Gibson, G Edward *CE* '03.....115 No Allen St Albany N Y
 Assistant Engineer State Engrs Office Telephone Bldg
 Gideon, Abraham *CE* '95.....MASCE Army & Navy Club
 Mang Dir Metropolitan Water Dist Manila P I
 Gifford, Robert L *CE* '91..MASCE Oak Knoll Pasadena Calif
 Pres Illinois Engrg Co 21st St & Racine Ave Chicago Ill
 Gildea, Ray Y *CE* '12..MECIBa 5225 York Rd Baltimore Md
 Tel Engr Maryland Pub Serv Comm Munsey Bldg
 Gillett, Maurice E *CE* '21....942 Niagara Ave Niagara Falls
 Member of Sudver Gillett Contr Co [N Y
 Gillette, Harold S *CE* '10....501 Wheat Bldg Ft Worth Tex
 Senior Hlghway Engineer U S Bureau Public Roads
 Gilmore, Alvin L *CE* '08....AASCE, MAAE 7770'Neil Bldg
 Cons Engr & Pres Bing Engrg Co Binghamton N Y
 Gilmore, Harry W *PhB CE* '01.....
 Giltner, Louis C *CE* '01.....Columbia Isle of Pines W I
 Cashier Nat Bank & Trust Co Neuva Gerona Isle of Pines
 W. I.
 Girard, Peter F Jr *CE* '22..163½ Broadway Rochester N Y
 Glose, Robert L *CE* '15....447 So Rebecca St Pittsburgh Pa
 Secy National Steel Fabric Co Union Arcade
 Goepel, Frederick N *CE* '07..137 E 13th St New York City
 Goff, Albert L *CE* '11.....Elba Genesee Co N Y
 Secy & Mgr Genesee-Orleans Veg Growers Coop Associa-
 tion Inc
 Golden, Harry E *CE* '91 Myron St R F D 1 Schenectady N Y
 Desng Engr General Electric Co Bldg No 23
 Goldstein, Hyman W *CE* '12 1388 Eastern Pkwy Brooklyn NY
 Chief Engr Bldg Prods Co Summitt & Sandusky Sts
 Toledo O
 Goldstein, Joseph *CE* '18.....1748 Washington Ave N Y C
 Tech Appr Westinghouse El & Mfg Co Lester Pa
 Gomez, José A *PhB CE* '08..AMASCE Box 713 Guayaquil
 Tech Comm for Sanitation of Guayaquil [Ecuador S A
 Gons, Louis R *BS CE* '13....JASCE 24 Milk St Boston Mass
 Engr Fred T. Lev & Co Inc
 Gonzalez, Rafael *CE* '11.....Quebradillas P R
 Chief Engr Isabela Irrigation Serv
 Goodman, Benjamin S *CE* '14..JASCE 2908 Keyworth Ave
 Room 709 47 W 34th St New York City [Baltimore Md
 Goodman, Max *CE* '12.....130 W 116 St New York City
 Industrial Consultant 30 Church St
 Goodman, Robert B *CE* '94.....Goodman Wis
 Manager Goodman Lumber Co
 Goodrich, Clinton R *CE* '05.....AMASCE Minonk Ill
 Commr of Public Works City Hall Utica N Y
 Goodwin, Harry L *CE* '15.....MAAE Deerfield N Y
 Benedict Co E Syracuse N Y
 Gordon, Fred F *CE* '93.....MASCE 75 So Union St
 Civil Engineer Eastman Kodak Co Rochester N Y
 Gordon, George *CE* '17....117 Chenango St Binghamton N Y
 Estimator Bldg Constr The Foundation Co N Y C
 Goninlock, Harold *CE* '12.....Box 77 Warsaw N Y
 With Climax Corp Mfrs Agricultural Impts Batavia N Y
 Gould, Carl A *CE* '07.....435 Humboldt St Denver Col
 Civil Engr 1121 First Natl Bank Bldg
 Grafman, William E *CE* '15..1507 Eastern Pkwy Brooklyn
 Engr Curtis Engineering Corp Garden City N Y [N Y
 Graham, Leland L *CE* '09....506 Winsor St Jamestown N Y
 Vice-Pres Chapman & Graham Inc Genl Contrs
 Graham, Roland R *CE* '12....AMASCE 217 McLean Ave
 Asst Engr Am Br Co 30 Church St N Y C [Yonkers N Y
 Graham, Samuel A *CE* '11 c/o Wm Allan 136 W 79th St NYC
 Mgr Tanners Trading Co of Aus Ltd 114 Hunter St Sid-
 ney Australia
 Graham, William S *CE* '16..2306 Elsinor Ave Baltimore Md
 Archt Renr for Geo A Fuller Co Pratt & Entaw Sts
 Grantz, Walter A H *CE* '20.....44 72d St Brooklyn N Y
 Draftsman & Desnr D P Robinson & Co 125 E 46th St NYC
 Graves, Walter J *CE* '99 MASCE 134 Hazelwood Ave Detroit
 Engr Mich Mutual Liability Co 1600 Real Estate [Mich
 Exch Bldg
 Gray, Edward T *CE* '01.....126 Tioga St Johnstown Pa
 Civil Engineer Cambria Steel Co
 Gray, Joseph H *CE* '17.....615 Jefferson Ave Elizabeth N J
 Amer Tel & Tel Co 105 Broadway New York City
 Gray, Ralph *CE* '21.....Maine N Y
 North Jersey Dist W S Comm Wauaque N J
 Greeley, Dana S *CE* '05 *ME*..Cotton Exchange Bldg N Y C
 Traveling Manufacturers Representative in South America
 Green, Francis K *CE* '21.....JASCE Middleburg Va
 Green, Charles N *CE* '88....MASCE 2848 Prospect Ave SE
 Pres The Osborn Engrg Co Cleveland O
 Green, Joseph L *CE* '12....4472 Oakenwald Ave Chicago Ill
 Green, Robert P *CE* '80 *MCE* '83..MESPA Swarthmore Pa
 Civil Engineer
 Greenawalt, William E *CE* '87..85 Sherman St Denver Colo
 Metallurgist
 Greene, Carleton *AB CE* '91....MASCE 151 W Turrell Ave
 Cons Engr Greene & Greene 11 Broadway [So Orange N J
 N Y C
 Greene, Wallace *CE* '74.....2024 Hillyer Place N W
 Patent Lawyer McGill Bldg Washington D C
 Grieg, Robert S *CE* '13.....Eldred Sullivan Co N Y
 Asst Supt Constr Brookwood Farms Barryville N Y
 Gridley, William G *CE* '09....MAAE 106 E Chemung Place
 Civil Engr QMC War Dept Arcadia Calif [Elmira N Y
 Griffin, Lawrence *CE* '10.....148 Taylor Ave Beaver Pa
 Ind Engr Jones & Laughlin Steel Co Woodlawn Pa
 Griffith, Fred C *CE* '20.....1426 Oneida St Utica N Y
 With N Y Tel Co Y M C A 55 Hanson Pl Brooklyn N Y
 Grime, John R *CE* '15.....Cazenovia N Y
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 Griswold, Hayden L *CE* '16.....Rocky Hill Conn
 Chief Party & Insptr State Hwy Dept Norwich Conn
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 Retail Lumber Dealer
 Griswold, Jonas W *CE* '01.....50 Grove St Pawtucket R I
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 Lieut CEC USN Navy Yard Puget Sound Wash
 Gross, Max *CE* '17.....752 Quincy St Brooklyn N Y
 Draftsman Gas Dept Riter-Conley Mfg Co Leetsdale Pa
 Grossman, Joseph G *CE* '12.....699 W 133d St N Y C
 Machine Shop Auto Parts
 Grossman, Max *CE* '12.....Atlantic City N J
 Manager Grossman's Hotel
 Gruner, Clarence E *CE* '07 819 Church St Richmond Hill N Y
 Civil Engineer
 Guest, John L *CE* '21.....1506 West Ave Richmond Va
 Desur Engrg Dept So Power Co Charlotte N C
 Guilbert, Richard T *CE* '17.....536 W 113th St N Y C
 With Agar Mfg Co Bush Terminal No 20 Brooklyn N Y
 Gulick, Charles W *CE* '22..209 W Park Ave Champaign Ill
 Desng Engr Llewellyn Iron Works Los Angeles Calif
 Gumboldt, Frank W *CE* '21.....Katonah N Y
 Soliciter Fred D Schneble Co Inc Ins Brkers 45 John St
 New York City
 Gurney, Frank M *CE* '12.....35 East St Onconta N Y
 City Engineer City Hall
 Guss, W. Granville *CE* '06....21 Hesketh St Chevy Chase Md
 Arch & Civil Engr 403 Maryland Bldg Washington D C
 Haas, S Ward *CE* '01.....42 Broadway N Y C
 Desng Engr Katauga Belgian Congo
 Hacker, Theodore W *CE* '17.....MECIB Baltimore Md
 Civil Engr c/o Norton Bird & Whitman 615 Munsey Bldg
 Hadley, Eugene J *BS* '71 *CE* '73 *LLB*....New Bedford Mass
 Lawyer 6 Beacon St Boston Mass
 Haefner, Carl W Jr *CE* '05.....AMASCE
 Sales Engr 68 State St Albany N Y
 Haggart, Philip W *CE* '11..5518 Center Ave El Pittsburgh Pa
 Haggart, William H R *CE* '17..1003 First Ave Fargo N Dak
 Haight, Andrew H *BS CE* '97.....R D 27 Millbrook N Y
 Haldeman, Lester T *CE* '22.....Westville N J
 Hales, Felix S *BE in CE CE* '16 MAAE MAREA 3315 Euclid
 Asst Engr N Y C & St L RR Co Cleveland O [Hts Blvd
 Halev, Francis A *CE* '19....630 Gotham St Watertown N Y
 M of W Dent N Y C R R
 Hall, Bruce L *CE* '10.....Cooperstown N Y
 Engineer 2612 No Calvert St Baltimore Md
 Hall, Earle W *CE* '14.....107 Linden Ave Arlington N J
 Desng Engr Standard Oil Co of N J Elizabeth N J
 Hall, Frederic F *CE* '00 MASCE 2411 Hillside Ave Berkeley
 Str Engr 251 Kearny St San Francisco Calif [Calif
 Hall, S Payson *CE* '10.....R F D Ithaca N Y
 Ham, D Harvey *CE* '14.....824 Sixth Ave Spokane Wash
 Hamilton, Charles F *CE* '97.....MASCE 1407 Buffalo St
 Gen Mer Northwestern Constr Co Box 621 Franklin Pa
 Hamlin, Harold F *CE* '05.....Lakeville Conn
 Hammel, Victor F *CE* '07 MASCE 1001 No Center St Joliet
 Engr of Designs Elect Bond & Share Co 71 Broadway [Ill
 N Y C

- Hanchett, Willis H CE '14..MAAE 147 Main St Brockport
Asst Engr CM & St P Ry Miles City Mont [N Y]
- Haney, Albert P CE '10 AMASCE 6 Summit Ave Amsterdam
Chief Engr John J Turner & Sons Engrg Contrs [N Y]
- Hanf, Porter V CE '15..MAAE Box 97 San Bernardino Calif
Chief Draftsman So Sierras Power Co Riverside Calif
- Hankenson, John J BCE MCE '94.....Glencoe Minn
Railway Location and Construction
- Hanna, Elias S CE '13.....Suez Egypt
Engineer Egyptian State Rwy
- Hannan, David E CE '07 AMASCE 4446 Drexel Blvd Chicago
Cons Engr and Architect 155 N Clark St [Ill]
- Hannigan, James CE '22..1221 Wyoming Ave Forty Fort Pa
Asst Engr F T Ley & Co Inc C U Heating Plant Ithaca N Y
- Hanson, George C CE '08....129 Main St Bridgeport Conn
American Consul Harbin China
- Hanson, Herbert C CE '09..1837 Monterey Rd S Pasadena
[Calif]
- Hardecker, John F CE '17....8415 Manor Ave Woodhaven
Aero Drafts U S Nav Aircraft Factory Phila Pa [N Y]
- Hardin, George D CE '13.....MWSE 4816 Kenwood Ave
Mun Contr 3139 Indiana Ave Chicago Ill
- Harding, Carroll R CE '10.....MAREA 15 Woodruff Ave
Asst Cons Engr So Pac Co 165 Broadway [Brooklyn N Y N Y C]
- Harding, Robert J CE '03.....MASCE 417 W Summit Ave
V P & Gen Mgr San Antonio Water Supply Co San Antonio Texas
- Harger, Wilson G CE '05.....296 Aldine St Rochester N Y
Consulting Engineer & Author
- Harn, John E CE '15..JASCE 3104 Remington Ave Balt Md
Secy & Treas Willard E Harn Co 2314 Oak St
- Harrington, Arthur W CE '09.....AMASCE
Hyd Engr U S G S 704 Journal Bldg Albany N Y
- Harris, Charles W BS CE '05..MPNWSE 5204 15th Ave NE
Acting Head Dept of Civil Engrg Univ of Wash Seattle Wash
- Harris, Joseph S CE '13....MAAE 937 E 156th St N Y C
Jun Engr Transit Constr Comm 49 Lafayette St
- Harrison, Alrich S CE '17..431 Riverside Dr New York City
- Harrison, Bernard J CE '20..JASCE 698 Hancock St Brook-
lyn N Y
- Harrison, George E CE '22..145 Leadenhall St London Eng
- Harrison, Howard G CE '07.....Box 2176 Spokane Wash
Secretary The Day & Hansen Security Co
- Harrison, Gerardus CE '10..AMASCE Larchmont Gardens
Goldmark & Harrison Cons Engrs 103 [Larchmont N Y Park Ave N Y C]
- Harshbarger, Elmer D CE '01..AMASCE 2239 Wightman St
Pres Pitt Constr Co 1218 Fulton Bldg Pittsburgh Pa
- Hart, Emmet E CE '87.....MAREA 2101 Adelbert Rd
Chief Engr N Y Chi & St L RR Cleveland O
- Hart, Linton CE '14..AMASCE 76 Marshall St Brookline
V P Rollin Constr Corp 80 Boylston St Boston Mass [Mass]
- Hartman, Eugene L CE '11..201 Luzerne Ave W Pittston Pa
Treas Hartman Supply Co 210 Blackman St
- Hartmayer, Herbert W K CE '20 60 W Oakland Pl Buffalo
[N Y]
- Hartwell, Clarence L CE '01.....47 Center St Kingston Pa
I E Hartwell & Son Civil Engrs Wilkes Barre Pa
- Hartz, Roger S B AB CE '13.....Palmyra Pa
With Claihorne-Johnson Contr Co Baltimore Md
- Harwood, Warner CE '16 MAAE 1870 Wyoming Ave Wash-
Jr Engr Dept Highways Cook Co Chicago Ill [ington D C]
- Hasbrouck, Carl J CE '20.....Highland N Y
Bond Salesman Bankers Trust Co Wall St New York City
- Haskell, Eugene E CE '79....MASCE FAAAAS Ithaca N Y
Dean Emeritus Coll Civil Engrg Cornell Univ
- Haslam, Erwin E CE '96.....MASCE 443 South Ave
Civil & Hydr Engr Wilkinsburg Pa
- Haswell, John R CE '09 AMASCE 403 Delaware Ave Wil-
Specialist Farm Mech Ext State Coll Pa [ilmington Del]
- Hatt, W Kendrick AB CE '91 PhD MASCE MAREA Lafay-
Director Hwy Res Nat Research Council [ette Ind Washington D C]
- Hauck, Thomas S CE '10..2225 Eutaw Place Baltimore Md
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- Haupt, Max CE '06.....5 Plumstead Ave Lansdowne Pa
Civil Engineer 1713 Sansom St Philadelphia Pa
- Havelin, Julius E CE '22.....956 57th St Brooklyn N Y
- Havens, Rodman W CE '80..MBklynEC 3202 Clarendon Rd
Civil Engineer Brooklyn N Y
- Havens, William L CE '16.....AMASCE Edmeston N Y
Asst Engr G B Gascoigne 648 Leader News Bldg Cleveland Ohio
- Hawley, Abraham L CE '86.....El Paso Texas
General Auditor El Paso & Southern R R Systems
- Hayden, John E CE '12.....MLSMInsh Ishpeming Mich
Mining Engineer Cleveland Cliffs Iron Co
- Hayes, Edward BCE '78 CE '90.....MASCE Cohoes N Y
City Engineer
- Hayes, Herbert E CE '09.....18 Amity St Cohoes N Y
Engrg Examiner State Civil Service Comm Capitol Bldg Albany N Y
- Hayes, Jeremiah J CE '16....1043 Clay Ave New York City
- Hayes, John CE '97.....Central Aguirre P R
Superintendent Ponce & Guayama R R
- Hayford, John F CE '89.....MASCE MWSE FAAAAS
Director Coll of Engrg Northwestern Univ Evanston Ill
- Healy, Edwin S CE '12 AAIEE 46 Adams Pl Glen Ridge N J
Asst Engr Elect Bond & Share Co 71 Broadway N Y C
- Healy, Gerald F CE '15.....729 Gotham St Watertown N Y
Vice-Pres G A Kelly Co Real Estate & Constr Flint Mich
- Hedden, Edmond J CE '92.....Bala Pa
Real Estate & Building 304 Finance Bldg Philadelphia Pa
- Hedden, Edward CE '87.....Box 57 Boise Ida
U S Surveyor General for Idaho
- Heidt, Charles CE '15.....MAAE 973 Whitlock Ave N Y C
Engineer Grand Central Terminal Bldg
- Heinitsh, George M CE '15 264 Spring St Spartansburg S C
31 Maple St Uniontown Pa
- Heise, Walter F CE '11.....1027 Rambler Ave
Plant Engr McClintic-Marshall Constr Co Pittstown Pa
- Heller, John W CE '01 AMASCE 9 Osborne Terr Maplewood
Engineering Contractor P O Bldg South Orange N J [N J]
- Hemmings, Harry H CE '17..639 E Third St Brooklyn N Y
Civil Engr Russell Sage Found 130 E 22d St New York City
- Henderson, Henry C CE '72 LLB..12 Greenridge Ave White
Lawyer Miles Building [Plains N Y]
- Henderson, Thomas R CE '07 514 So 42nd St Philadelphia Pa
- Hendricks, Ernest D CE '03.....MASCE Fort Plain N Y
Division Engineer State Engineer's Office Albany N Y
- Hendrickson, Geo L CE '11.....R D 2 Danville Pa
Asst Engr Am City Engrg Co Peoples Bank Bldg Pitts-
burgh Pa
- Hendry, Robert W CE '14..1337 Pensacola St Honolulu T H
Engineer of Hilo Dept of Public Works & Co Engrs Off Hilo T H
- Herman, Abbott P CE '19..627 Maplewood Ave Ambridge Pa
Draftsman American Bridge Co
- Hermann, Charles E CE '21....4601 Maryland Ave St Louis
Student McCormick Theol Sem Chicago Ill [Mo]
- Herr, Frederick J CE '07....419 Fourth St Brooklyn N Y
Hardware Merchant 284 Fifth Ave
- Herriman, Morris W CE '20.....320 No Franklin Ave River
Chief Engr Stanford Oil Co [Forest Ill]
- Herrmann, Frank CE '14 MAAE.....
State Asst Engr Oklahoma City Okla
- Hertel, Frederick E CE '15..68 Linden Road Melrose Mass
Engr Stone & Webster Inc 147 Milk St Boston Mass
- Heslop, Paul L CE '14..AMASCE MAAE Good Samaritan
Hydr Engr with C B Hawley 1103 [Hospital Portland Ore Munsey Bldg Wash D C]
- Hess, Seth G CE '15.....200 Cathedral Parkway N Y C
Real Estate 607 Fifth Ave
- Hettinger, Harold I CE '21..879 Stephensen St Freeport Ill
c/o Venezuelan Sun Ltd Aptdo 34 Maracaibo Venezuela
- Hettrick, Ernest F CE '10.....Birmingham Ala
E. F. Hettrick Engrg Co Engrs & Contrs 223-4 Jefferson
Co Bank Bldg
- Heuheck, Elmer CE '12 Fifth Ave Rognel Hts Baltimore Md
Engr Pa Water and Power Co Lexington Bldg
- Hewitt, George W CE '09..119 Jefferson Ave Niagara Falls
Cary-Hewitt Metal Works Inc Buffalo N Y [N Y]
- Highley, Lee CE '97.....New Meadows Ida
Asst Cashier Meadows Valley Bank
- Hilborn, Edwin CE '91..MSEENY MNGS Port Leyden N Y
Asst Engr Barge Canal Off Herkimer N Y
- Hilborn, William H CE '10.....Phoenix N Y
- Hildreth, Norman E CE '09..46 Waverly St Pittsfield Mass
V P J R Hampson & Co Genl Contrs 184 North St
- Hill, Curtis CE '97.....MASCE 4210 Holmes St
City Engineer Kansas City Mo
- Hill, Harry W CE '13....1503 No Caroline St Baltimore Md
Capt U S A 11th Engrs Carazol Panama C Z
- Hill, John E MS CE MCE '95..MASCE FAAAAS 86 Taber
Prof Civil Engineering Brown Univ Providence R I [Ave]
- Hill, Raymond C CE '12.....261 Fair St Paterson N J
- Hill, Theodore W CE '93.....Bellefontaine O
Contracting Engineer
- Hillemeier, Arthur CE '09..58 West Seventh St Mt Vernon
Civil Engineer [N Y]
- Hillman, Charles A CE '17....89 Harrison St E Orange N J
- Hilpert, Meier G BS CE '01..MASCE Box 1054 Harrisburg
Asst Engr Beth Steel Bridge Corp Bethlehem Pa [Pa]

- Hilton, Joseph C CE '96..AMASCE 8 Larchmont Ct Larch-
Supt Foundation Co 120 Liberty St N Y C [mont N Y
- Himes, Albert P CE '16..MAAE 8313 Cedar Ave E Cleveland
Asst Engr N Y C & St L RR Co 514 Columbia Bldg [O
- Hinck, Frederick W CE '10....352 E 25th St Brooklyn N Y
Str Engr Buchman & Kahn Archts N Y C
- Hinks, Warren H CE '12.....846 Franklin St Johnstown Pa
Mem Firm Fetterman Engr Co 705 Johnstown Trust Bldg
- Hirsch, Emanuel CE '20.....MAAE Amityville N Y
- Hirsch, Herman D CE '10..AMASCE 1462 Park Pl Brooklyn
Res Engr U S Steel Products Co Capetown S Africa [N Y
- Hiscock, George S CE '19.....Box 1084 Southampton N Y
McClintic-Marshall Constr Co 730 Hill St Wilkinsburg Pa
- Hoar, Prescott D CE '05.....140 Wadsworth Ave N Y C
- Hobart, Charles B CE '98.....Ventnor N J
Chief Engr Compeche-Laguna del Carmen Mex
- Hock, Harold L CE '16.....703 Main St Buffalo N Y
Assistant Engineer N Y State Comm of Highways
- Hoehn, Charles E CE '13.....Albany N Y
Junior Engineer N Y State Barge Canal
- Hoff, Edwin J CE '22.....209 College Ave Ithaca N Y
Asst Engr N Y State Gas & Elect Corp
- Hoff, Trygve W CE '21.....Park St Upper Montclair N J
Res Engr Vinton Colliery Co Claghorn Pa
- Hoffeld, Henry R CE '87.....Lancaster N Y
Mem Firm R Hoffeld Co 65 Carroll St Buffalo N Y
- Hoffert, J Raymond CE '11.....AMASCE 12 So 19th St
Dist Engr State Dept of Health Harrisburg Pa
- Hoffman, Charles A CE '17..MTS 609 No Fifth St Reading
Planning Dept Vanity Fair Silk Mills [Pa
- Hofstadter, Meyer CE '13..342 Stuyvesant Ave Brooklyn N Y
Contrg Engr McClintic-Marshall Constr Co 50 Church St
N Y C
- Hogan, Joseph V CE '08..AMASCE 224 Paddock St Water-
Chief Engr The Arundel Corp Pratt St Balti- [town N Y
more Md
- Hoge, Philip B CE '08.....949 Cross Ave Elizabeth N J
Asst Engr Inv & Report C E Knoepfel & Co N Y C
- Holbrook, Roy B CE '10..23 Oxford Rd Newton Center Mass
Farmer, Royal Ridge Farm Front Royal Va
- Holdredge, Earl B CE '11..1024 Euclid Ave Syracuse N Y
Sales Engineer Truscon Steel Co 440 The Gurney Bldg
- Holland, Franklin E CE '12..4214 Western Ave Montreal Can
Manager Railway Sales Dept Sherwin-Williams Co of Can
Ltd
- Holloway, Arthur P CE '07..223 Upper Mountain Ave Mont-
Salesman Wheeling Steel Corp Wheeling W Va [clair N J
- Holloway, Henry F Jr CE '15.....223 Upper Mountain Ave
[Montclair N J
- Holmes, Edward CE '05..MAAE 2844 Rockwood Pl Toledo
Terminal Engineer Willys-Overland Co [O
- Holmes, Edward B CE '12.....216 Main St Keene N H
Mining Engr Rio de Janeiro Brazil c/o E J Lavino & Co
Phila Pa
- Holmes, Glenn D CE '96.....MASCE 204 W Kennedy St
Chief Engr Intercepting Sewer Board Syracuse N Y
- Holmquist, Carl A CE '10.....
Director Div of San Albany N Y
- Holt, Thomas B CE '19.....402 Stewart Ave Ithaca N Y
Union Pacific Coal Co Rock Springs Wyo
- Holzman, Jacob C CE '10..MSMENY 124 W 114th St N Y C
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- Hopkins, Cecil B CE '07.....AMASCE San Francisco Calif
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- Hopkins, Frank S CE '11....50 So Clinton St Poughkeepsie
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- Hopkins, Howard C CE '03..2337 Fargo St Los Angeles Calif
Civil Engineer
- Horne, George W CE '73.....R D 2 Belmont N Y
- Horton, Albert H CE '98..AMASCE MWSE 1307 Gallatin St
Hydr Engineer U S Geog Survey Washington D C
- Horton, Philip Z CE '10.....MAAE AMASCE Peoria Ill
Civil & San Engr 401 Central National Bank Bldg
- Hou, Chia Y MCE '19 JASCE 31 Zan Ka Da Soochow China
Draftsman McClintic-Marshall Constr Co Pittsburgh Pa
- Hough, Floyd W CE '19..JASCE 82 Bridge St Catskill N Y
Jun Hydro & Geod Engr USCGS Washington D C
- Hough, Lawrence C CE '14..AMASCE East Falls Church Va
New Eng Repr Pitometer Co 710 Albany St Boston Mass
- Houston, Levin J Jr AB CE '01 MAAE Fredericksburg Va
City Manager
- Howard, David A CE '11.....3123 N St Washington D C
- Howard, Thomas CE '01....758 Gotham St Watertown N Y
Asst Engr N Y State Highway Comm
- Howe, Harry N CE '04.....AMASCE Memphis Tenn
Engr Gardner & Howe 76 Porter Bldg
- Howell, Charles J CE '19....24 So Seward Ave Auburn N Y
Sales Engr Pittsburgh-Des Moines Steel Co Pittsburgh Pa
- Howell, Eris V CE '14 MCE '18.....Southampton N Y
Instructor School of Civil Engrg Cornell Univ Ithaca N Y
- Howland, Charles A CE '12.....MECIKC 5822 Locust St
Civil Engr Benham Engrg Co 512 Gumbel Bldg Kansas
City Mo
- Howland, Rufus B CE '72.....Trumansburg N Y
Retired
- Hoy, William W CE '95....1225 French St Santa Ana Calif
Consulting Engineer 413 No Main St
- Hoyt, Herbert B CE '09 MAWPA 294 South Ave Bradford
Supt Timber Preserving Plant B R & P Ry Co [Pa
- Hoyt, John C CE '97.....MASCE MWASCE 1446 Belmont
Hydr Engr in Chg Sur Waters Div U S Geol [St N W
Survey Washington D C
- Hoyt, Lawrence W CE '22....29 Pleasant St Danbury Conn
- Hoyt, Raymond H CE '15 180 Greyrock Place Stamford Conn
- Hoyt, William G CE '09..AMASCE 4618 So Salina St Syra-
Hydr Engr U S Geol S Washington D C [cuse N Y
- Hsu, Yush S CE MCE '12....Tung Wu Col Soochow China
Asst Engr Canton Hankow Ry Changsha Hunan China
- Hu, Tung Chao BS in CE MCE '05..MChES Shanghai China
Chief Tech Dept Nanking-Hunan Ry Nanking China
- Huang, Chia-Chi MCE '18 MSSCh MChES c/o Mr H Penn
[441 Ming Hoa Li Hardoon Rd Shanghai China
- Huestis, Charles C AB CE '92 AMASCE 11 Northwood Blvd
President Carbon Mining Co Carbon Ind [Greencastle Ind
- Hugger, Albert J CE '21..2354 Madison St Ridgewood N J
Traffic Dept N Y Tel Co 15 Dey St New York City
- Hughes, Norman AB CE '10.....Jackson N C
Manager H & W W Newhern Co Powells Point N C
- Hulburt, Lucius S CE '03....AMASCE Brasher Falls N Y
Sen Asst Engr N Y State Engrs Off Albany N Y
- Hulse, Shirley C CE '02.....MASCE Bedford Pa
Field Engr H D Wallbridge & Co Foxburg Pa
- Hunkin, Alger E CE '20.....Lakeland Ave & Clifton Blvd
Bldg Supt Hunkin-Conkey Constr Co Cleveland Ohio
- Hunkin, Samuel E CE '17....15907 Lake Ave Cleveland Ohio
Constr Supt Hunkin-Conkey Constr Co
- Hunt, Clinton S CE '13....387 Aberdeen St Rochester N Y
Phoenix Utility Co Frackville Pa
- Hunt, Guy H CE '08.....Los Angeles Calif
Univ of Southern Calif
- Hunt, Harold G CE '22.....16 Benefit St Worcester Mass
- Hunt, Sidney E CE '94.....Portlandville N Y
Minister Methodist Episcopal Church
- Hurlbut, Hinman B CE '01 MASCE 125 Elm St Montclair NJ
- Hurley, John P CE '07.....
U S Consul Riga Russia
- Hurler, John W CE '10....2012 Harbert Ave Memphis Tenn
Jun Engr U S Engr Off Charge Revetment Constr
- Hutchison, James H CE '06.....116 Main St Newark Del
With Del Sch Auxiliary Assoc 8126 DuPont Bldg Wilming-
ton Del
- Hutson, Arthur C BS CE '05..140 No 16th St E Orange NJ
Off Engr Nat Bd Fire Underwriters 76 William St N Y C
- Hyatt, Edward K CE '10.....St Louis Mo
Pres Taylor-Hyatt & Co Contrs
- Hyde, Alfred T CE '73.....Lorton Va
Constr Cumberland Pipe Lines in Kentucky
- Hyde, Edward W CE '72 MCE '74..MAIA 814 Lincoln Ave
Actuary Columbia Life Ins Co 4th & Elm Sts Cincinnati O
- Hyde, Howard E CE '00..MASCE 302 W Seneca St Ithaca
President Young & Hyde Inc Prod Exch Bldg N Y C [N Y
- Hyde, Richard L CE '17....JASCE 411 Friendship St Provi-
[dence R I
- Hynds, Harold D CE '12.....AMASCE 61 Pierrepont St
Contr Engr Turner Constr Co 244 [Brooklyn N Y
Madison Ave N Y C
- Icasiano, Abelardo R CE '17....MAAE Bulacan Bulacan P I
- Iglehart, Joseph A W CE '14....1406 Park Ave Baltimore Md
J A W Iglehart & Co Investment Bonds Title Bldg
- Infanger, Adolph O CE '18..24 Watson Ave E Orange N J
With Bank of New York 48 Wall St N Y C
- Ingalls, Owen L CE '86.....
Asst Engr U S Engineers Office Galveston Tex
- Ingalls, Robert D CE '17.....Phelps N Y
Capt Corps of Engrs USA Ala Polytech Inst Auburn Ala
- Ingersoll, Vernon S CE '98..10 Scott Place Rockville Center
Civil Engineer [N Y
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Asst Engr Quinton Code & Hill Cons Engrs Los Angeles
Calif
- Irwin, A Charles BS MCE '16..MAAE MAREA 4450 No
Engineer Portland Cement Assoc Chicago Ill [Richmond St

- Ivanek, Bertram B CE '20.....Mt Hermon Mass
- Jackson, J Ceylon CE '15.....New Milford Pa
Jun Engr U S Engineering Dept First District N Y C
- Jackson, Leon E CE '10.....55 Field St Rochester N Y
- Jackson, William CE '90....AMASCE 7417 Church Ave Ben
Desng Engr Amer Br Co Frick Bldg Pittsburgh Pa [Avon
- Jacobs, Robert H CE '93.....MAAE, MASCE, N Y C
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- Jacoby, Hurlbut S AB '08 CE '10 AMASCE 6523 Euclid Ave
Secy & Chief Engr The H K Ferguson Co [Cleveland O
- James, Robert L CE '12.....21 W 93d St N Y C
Tech Dept Vacuum Oil Co Lisbon Portugal
- Janney, William H CE '74..1815 No Charles St Baltimore Md
- Japhet, W Ernst BS CE '08.....Box 735 Houston Tex
Engineer Petroleum Refining Co
- Jaret, Milton AB '13 CE '14.....1957 85th St Brooklyn N Y
- Jarvis, George M CE '78..742 E Penn Ave San Antonio Tex
Retired
- Jenkinson, Richard D CE '07..15 N Howard Ave Bellevue Pa
Real Estate and Insurance
- Jennings, Louis C CE '10.....135 Pelham St Newport R I
Res Engr The Foundation Co Ltd St Jerome P Q Can
- Jenrick, William F BS CE '10.....AMASCE 113 White St
Estmr Stone & Webster Engrg Corp 147 [Waverly Mass
Milk St Boston Mass
- Johnson, Albert M CE '95..6353 Sheridan Road Chicago Ill
President National Life Ins Co of USA 29 So La Salle St
- Johnson, Albert T Jr CE '11.....
Plant Engr Great Western Electro-Chem Co Pittsburgh
Calif
- Johnson, Berkeley CE '20..93 Fairfax Road Worcester Mass
Water Resources Br USGS 615 Idaho Bldg Boise Idaho
- Johnson, C Reid CE '13.....2902 St Paul St Baltimore Md
Lieut (jg) CEC USN Submarine Base New London Conn
- Johnson, Donald S CE '15.....Evanston Hotel Evanston Ill
- Johnson, Eugene C CE '05..686 Catalina St Los Angeles Calif
Chief Engineer Pacific Elec Ry Co
- Johnson, Harvey S CE '11.....65 Sussex St Port Jervis N Y
Asst Engr Bossert Corp 1408 Oneida St Utica N Y
- Johnson, Hollister CE '12.....AMASCE Dryden N Y
Asst Engr Black River Regulating Dist Watertown N Y
- Johnson, James A CE '13.....Warsaw N Y
President Oatka Engineering & Construction Co Inc
- Johnson, Lawrence CE '01.....Collinsville Conn
Civil Engineer
- Johnson, Clifford C CE '12.....
Johnson, Edgar CE '00.....733 Park Ave E Orange N J
Manager Mountain Ice Co Orange N J
- Johnston, Jesse C CE '13.....308 E Olive St Lamar Colo
Merchant
- Johnston, Miles C AB BS CE '12..707 Chamber of Commerce
Engr Carneal & Johnson Archts and Engrs [Bldg
Richmond Va
- Johnston, William R Jr CE '05..28 Yale St Maplewood N J
Engineer I, V R R 143 Liberty St New York City
- Jones, Bevan CE '06.....174 W 89th St N Y C
- Jones, Harold H CE '10..3412 Second Ave W Vancouver B C
Logger 921 Vancouver Block
- Jones, Henry H CE '20.....Durham N C
c/o State Hwy Comm Raleigh N C
- Jones, Jacob O BS MCE '15.....AMASCE, MSPEE
Assoc Prof Hydr Engrg Univ of Minn Minneapolis Minn
- Jones, William M CE '18....480 Convent Ave New York City
Engrg Dept Turner Constr Co of N Y Atlanta Ga
- Josefson, Abraham CE '22....5 E Main St Middletown N Y
- Joseph, Louis W CE '20.....Warrensburg N Y
- Joseph, William B CE '13 1201 W Seventh St Wilmington Del
- Judson, David H CE '07.....421 Stolp Ave Syracuse N Y
Truscon Steel Co 440 Gurney Bldg
- Justin, Joel D CE '06..MASCE 743 Amherst St Buffalo N Y
Chf Engr Dept H-E P R W S & S The Ludlow Engrs Inc
Winston-Salem N C
- Kalberg, S August CE '10....AMASCE 39 Dwight St New
[Britain Conn
- Kampf, Louis CE '09.....33 Division St Norwich Conn
Textile Engineer Anderson Meyer & Co Tientsin China
- Kang, Shih Cheng MCE '22 Sing Chang Pootung Shanghai
[China
- Kaufman, Abraham CE '15.....
- Kaufman, Ernst G CE '11..AMASCE 315 Adelphi St Brook-
Estmr Guggenheim-O'Brien Co Inc 420 Bond [lyn N Y
Bldg Wash D C
- Kaufman, Morris L CE '12..1145 Carroll St Brooklyn N Y
- Kaufman & Levine Cons & Ind Engrs 56 Pine St N Y C
- Kaufman, Samuel CE '19..1389 Stebbins Ave New York City
Asst Engr of Constr United El Lt & Pow Co 130 E 15th St
- Keating, Thomas F Jr CE '17..11 E 87th St New York City
Insp & Serv Dept Plate & Robb Ins Brkrs 100 William St
- Keays, Reginald H CE '95.....AMASCE
Supt Ulen Contracting Corp Allaben N Y
- Keeler, Louis V CE '13.....
Broker 24 Stone Street New York City
- Keenan, James N CE '09....461 W 159th St New York City
Dist Sales Manager H H Robertson Co 170 Broadway
- Kehler, Sherman I CE '94 MCE '03..1800 Oakley St Balti-
Assoc Civil Engr City of Baltimore [more Md
- Kehoe, Harry CE '08.....35 E Utica St Oswego N Y
Civil Engineer
- Kehrhahn, Charles J CE '09..MAAE, MCIES 13600 Fourth
Asst Engr Dept Grade Crossing Elim [Ave E Cleveland O
N Y C & St L R R Cleveland O
- Keller, Arthur R CE '03..AMASCE 2456 Oahu Ave Honolulu
Dean College of Applied Science Univ of Hawaii [T 11
- Kelley, Charles L CE '85.....Main St Savannah N Y
Civil Engineer
- Kelley, George B CE '08..1 Thirteenth St Upper Troy N Y
Jun Engr N Y State Barge Canal
- Kelley, William D BS MCE '81..MASCE 1450 Crawford Rd
Kelly-Demarest Constr Co 418 Amer Trust [Cleveland O
Bldg
- Kellogg, George D CE '07.....Greenwood N Y
Asst Engr N Y State Engineers Dept Albany N Y
- Kelly, Edward DeV CE '10.....Oriskany N Y
- Kelly, Edward J Jr CE '12.....61 W Erie Ave Corning N Y
- Kelsey, Clifford S BA CE '88..162 Remsen St Brooklyn N Y
Secy-Treas & Vice-Pres Realty Associates
- Kelsey, Sidney E CE '87..1824 Jefferson St Kansas City Mo
Asst Cmondnt & Prof Math Wentworth Mil Acad Lex-
ington Mo
- Kendall, Charles H CE '95 MS.....MASCE
Asst State Highway Engineer Austin Tex
- Kennedy, James C CE '79.....Sacramento Calif
Consulting Engineer Box 1072 Motor Route B
- Kennedy, Robert C CE '21.....East Rochester N Y
Jun Asst Engr N Y State Hwy Dept Rochester N Y
- Kerby, Charles K CE '15.....40 Rugby Road Brooklyn N Y
Thompson-Starrett Co Long Island City N Y
- Kerby, Russell T CE '13..1019 Kenmore Place Brooklyn N Y
Engr Am Tel & Tel Co 195 Broadway N Y C
- Kessler, William CE '13.....23 Ninth St Woodside N Y
Asst Engr U S G S 328 Custom House San Francisco Calif
- Kibbe, Harmon C CE '16.....JASCE 2722 Ashby Ave
Salesman Cobbledeck-Kibbe Glass Co Berkeley Calif
- Kidde, Reguar T CE '13....215 W 101st St New York City
- Kiddie, John CE '04.....MAAE, MAIM&ME, Morenci Ariz
Mine Supt Longfellow Mining Div Arizona Copper Co
- Kiep, Henry A Jr CE '10.....R F D 55 Westfield N J
Industrial Finance Dept Robertson Cole Co N Y C
- Kimber, George F CE '12.....Augusta St Kingston N Y
- King, Alvin W CE '07..MASME 108 E Moreland Ave Chest-
Dist Sales Mgr Fulton Co 50 Church [nut Hill Phila Pa
St N Y C
- King, Everett E AB CE MCE '11 AMASCE MAREA Urbana
Prof Ry Civil Engineering University of Illinois [Ill
- King, Leon T CE '10.....
Jun Engr N Y State Barge Canal Herkimer N Y
- King, Paul CE '16.....Emporia Va
Engr & Survr Atlantic Coast Realty Co Petersburg Va
- King, Tang MCE '21.....406 Hankow Road Shanghai China
Nanyang Construction Co
- King, Tao CE '12..AMASCE 33 Tou Fa Hutang West City
Res Mem Comm on Ry Technics Min of Communications
Peking China
- Kingsland, Lawrence D II CE '17..Hotel Beers St Louis Mo
Civil & Hydr Engr Foundation Co Rifa 332 Lima Peru S A
- Kinnear, Eugene C CE '07 1882 Columbia Rd Washington D C
- Kipp, Frederick M Jr CE '14....JASCE 3705 Chestnut Road
Asst Engr Conservation City Water Dept Baltimore Md
- Kirschner, Charles CE '14 AMASCE 427 Fourth St Troy N Y
Asst Field Engr Bd of Commrs Port of New Orleans La
- Klaber, John J CE '06.....MSAME 124 W 88th St
Architect 101 Park Ave New York City
- Klecka, Joseph MCE '22..10 Dobrovskeho Brno Czechoslov-
[akia
- Knapp, Frank H CE '11.....AMASCE, Blasdel N Y
U S Reclamation Service El Paso Tex
- Kneeland, Herbert D CE '10..MESWPA 230 Breeding Ave
Prod Mgr Untd Engrg & Fdry Co [Ben Avon Pgh Pa
2311 Farmers Bank Bldg Pittsburgh Pa
- Knighton, John A CE '91....MASCE 207 W 107th St N Y C
Div Engr (Harlem River Div) Dept Pl & Str 2221 Madison
Ave
- Knoch, Julius J MS CE '92....1717 Gains St Little Rock Ark
Carter & Knoch Cons Engrs 803-807 A O U W Bldg
- Knowlton, George F CE '20.....
Blake Bros & Co Box 607 New York City

- Knowlton, Robert H *CE* '06 MNEIA MAIEE 211 Cornell Power Engr United Gas Imp Co [Ave Swarthmore Pa Phila Pa
- Koester, Edwin F *CE* '13..1917 Washington St Wilmington Engr in Chg Surveying Dept Municipal Bldg [Del
- Kohn, Arthur H *CE* '06..401 E Seventeenth St Brooklyn N Y
- Kolberk, Andrew *CE* '12.....305 E 161st New York City Assistant Engineer I R T Co 156 Broadway
- Koo, Nee Sun *MCE* '19 *PhD* '21..MESCh Nai Wai Shanghai 408 W 115th St New York City [China
- Koopman, Jacob *CE* '13....c/o Arthur McMullen Co N Y C Engineer with Arthur McMullen Co of New York Cheswick Pa
- Korff, Harry O *CE* '16..1720 W Lafayette Ave Baltimore Md
- Kornfeld, Harry *BS CE* '11....AMASCE 106 Stratford Ave Engr Bldg Dept General Electric Co [Pittsfield Mass
- Kraft, George L *CE* '15..1730 First St N W Washington D C Captain Infantry U S A c/o Adjutant General of the Army
- Kramer, Edwin W *CE* '06....1801 So Fifth St Missoula Mont Dist Hydro-Elect Engr U S For Service 508 Montana Bldg
- Kratzenstein, Hugo *AB CE* '04....7 E 94th St New York City Civil Engineer 152 W 88th St
- Krause, Alois W *CE* '12.....152 Crafts St Newtonville Mass Secy Geo E Warren Co 35 Congress St Boston Mass
- Krauss, John S *CE* '17.....974 St Nicholas Ave N Y C
- Kristal, Frank A *CE* '08.....830 W 179th St New York City Mem of Firm Mayfair Undergarment Co 16 E 18th St
- Kronberg, Sol *AB CE* '08..615 W 150th St New York City Secy Supertone Talking Machine Co 18 W Twentieth St
- Kruse, Otto V *CE* '09.....AMASCE Philadelphia Pa Hyd Engr Larner-Johnson Valve & Engrg Co Colonial Trust Bldg
- Krusi, Herman *CE* '82.....2033 Central Ave Alameda Calif Retired
- Kuck, John F R *BS CE* '12.....MAAE 22 W Harris St Asst Engr Central of Ga Ry Savannah Ga
- Kupfer, Max *CE* '22.....891 DeKalb Ave Brooklyn N Y
- Kurcias, Max *CE* '18.....63 E 177th St New York City Civil & Refrig Engineer U R D Green 154 Nassau St
- Kurtz, Ford *CE* '07.....MASCE New York City With J G White Engrg Corp 43 Exchange Pl
- Kurz, Ernst W *CE* '17.....719 E State St Ithaca N Y Ward & Kurz Contrs & Bldrs
- Kwei, Ming King *MCE* '22..1558 Kashing Road Shanghai [China
- LaBreque, Henry F *CE* '07..126 Winthrop St Brooklyn N Y
- Lacazette, Alfred A *CE* '13.....ASME AMASCE c/o Standard Oil Co of Brazil Rio de Janeiro Brazil
- LaCroix, Arthur E *CE* '16..734 Pleasant St Worcester Mass Asst to Hydr Engr New England Power Co 35 Harvard St
- Lahr, Charles *CE* '15.....51 Chicago St Elmhurst N Y Jun Engr N Y State Pub Ser Comm N Y C
- Lamoureux, Vincent B *CE* '20.....Forest Home Ithaca N Y
- Lanahan, Howard G *CE* '09..124 W 15th St Spokane Wash Building Materials 318 No Division St
- Lance, John H *CE* '96..MASCE 426 Rutter Ave Kingston Pa Cons Engr 616 2d Nat Bank Bldg Wilkes-Barre Pa
- Lance, William L *CE* '08.....426 Rutter Ave Kingston Pa With J H Lance Cons Engr Wilkes-Barre Pa
- Landa, Francisco *CE* '07.....MCUSE Paseo 194 Vedado Engr Insptr Hav Elec Ry Light & Pow Co Havana Cuba
- Landis, Charles W *CE* '00....14 Hamilton Ave Cranford N J Asst Contr Mgr U S Steel Products Co 30 Church St N Y C
- Landon, Eugene A *CE* '80.....MASCE Groton N Y Secretary and Treasurer Regent Lumber Co
- Lane, Emory W *CE* '14..AMASCE 1038 Heath St Lafayette Mgr China Off Morgan Engr Co Yang Chow China [Ind
- Lanpher, Edwin E *CE* '09....540 Sheridan St Pittsburgh Pa Division Superintendent Bureau of Water
- Lara, Edward M *CE* '03.....Bend Ore Cashier First National Bank
- Larned, William H *CE* '84.....Haigler Neb Cashier State Bank of Haigler
- Lathrop, John P P *CE* '92.....MECIPh Wayne Pa Civil Engineer and Contractor Overbrook Pa
- Latting, Benjamin F *CE* '94.....Muncie Ind Designing Engr Indiana Bridge Co
- Lau, Wau W *AB* '14 *CE* '15.....Tientsin China Assistant Engineer River Improvement Comm
- Lauck, Edward W *CE* '22.....Luray Va
- Lavine, I William *CE* '15..253 Tompkins Ave Brooklyn N Y Bldr & Contr 9110 Lefferts Ave Richmond Hill N Y
- Lawrence, Frank E *CE* '06.....AMASCE 415 W 36th St President Lawrence Construction Co [Savannah Ga Augusta Ga
- Lawrence, Theodore F *CE* '88.....Chester N Y Cheese Manufacturer
- Lawson, David T *CE* '73.....
- Lay, Charles H *CE* '74.....149 W Third St Oil City Pa Retired
- Lazo, Antonio *CE* '07.....108 E 82d St New York City Investment Banker 115 Broadway
- Lechler, Bruno C *CE* '08 *LLB*....MASME 222 Prospect Ave Mgr Sugar Mach Dept Fletcher Work [Maywood N J Philadelphia Pa
- Ledger, William H *MCE* '95..MICE Railway Crescent Bar-Metropolitan Railway Construction Sydney N S W [croft
- Lee, A Carl *CE* '10.....MASCE Div Engr Southern Power Co Charlotte N C
- Lee, Don *BS in CE CE* '13.....AMASCE San Angelo Tex Sales Engr Lakewood Engrg Co 711 Sumpter Bldg Dallas Tex
- Lee, Haw-Shen *CE* '16.....Yu Yao Chekiang China Eng Secy to Chf Engr Tientsin-Pukow Ry Tientsin China
- Lee, K *MCE* '17.....
- Lee, Kohn Sam *CE* '13....14 Helen Terrace Shanghai China Business
- Lee, Teh Tsing *CE* '11 *MCE* '12.....Tientsin China In charge Des & Dr Off Wks Dept Chili Riv Comm
- Leggett, Edward H Jr *CE* '12 MAISCE 8 So Allen St Albany Auditor's Off The Delaware & Hudson Co [N Y
- Lehman, Alvin S *CE* '21.....339 Moss Ave Peoria Ill Supt Federal Warehouse Co
- Lehrbach, Henry G *CE* '15.....AMASCE 363 Dearborn St Lieut (S G) C E C USN Loma Portal Calif [Buffalo N Y
- Lehrbach, Warren W *CE* '17.....Massapequa N Y Circ Repr McGraw-Hill Co Inc New York City
- Lent, C Hersey *CE* '11..2411 Beverley Road Brooklyn N Y Sec Brown Lent & Pett Inc 90 William St N Y C
- Leonard, Edward P *CE* '09....409 Macon St Brooklyn N Y c/o J G White Engrg Corp 43 Exch Pl N Y C
- Leonard, Samuel J *CE* '17.....520 G St NE Washington D C Engr The Stair Sales Co Inc Akron O
- Leschen, William F *BS CE* '09..6409 Enright St St Louis Mo Oil and Coal By-Products 601 Bank of Commerce Building
- Lessin, Samuel *CE* '12.....1678 Union St Brooklyn N Y Jun Engr N Y State Pub Ser Comm N Y C
- Leung, Chin-Yuk *CE* '14 *MCE* '15..Jardine Matheson & Co [Tientsin China
- Levine, Harold J *CE* '12....AMASCE 140 E 92d St N Y C Kaufman & Levine Cons & Ind Engrs 56 Pine Street
- Levine, Lionel M *CE* '10.....530 Manhattan Ave Cons Engr 29 Broadway New York City
- Levine, Samuel *CE* '11.....355 Riverdol Ave Brooklyn N Y
- Levy, Robert *CE* '13.....P O Box 598 Woodmere N Y Mgr Textile Leather Co Brown St & Lister Ave Newark N J
- Lewis, Clarence C *CE* '91 MASCE 1815 E 89th St Cleveland O Gen Mgr Cia Luz y Fuerza Cordoba Argentina S A
- Lewis, Dudley L *CE* '08.....2509 May St Fort Worth Tex City Engineer City Hall
- Lewis, John H *CE* '03.....AMASCE MORSE Portland Ore Lewis & Clark Cons Engrs 805 Chamber of Comm Bldg
- Lewis, John M *CE* '08.....MAIM&ME Elkhorn W Va Chief Engineer Houston Interests
- Lewis, Roger *CE* '95 *LLB* '97..320 W 78th St New York City Lawyer Care Guthrie Jerome Rand & Kresel 37 Wall St
- Li, Chuan Heng *CE* '18..18 Kennedy Road Hong Kong China Genl Supt of Inspn M of W Dept Yueh-Ilan R R
- Li, Kien Yo *CE* '11.....Kalgan China Office Chief Engineer Peking Kalgan Ry
- Liebeskind, Morris *CE* '21.....215 E 103d St New York City Draftsman Amer Bridge Co Trenton N J
- Lilly, Scott B *BS CE* '09....148 Parkside Ave Brooklyn N Y Sales Engineer 30 Church St New York City
- Lindau, Sigmund B *CE* '18 MAAE 612 Summit Ave Greens-Jun Asst Engr N Y State Hwy Dept Penn Yan NY [boro SC
- Lindberg, Henry E *CE* '19....900 Federal St Pittsburgh Pa Designer Pittsburgh-Des Moines Steel Co 607 Curry Bldg
- Linnell, Herbert H *CE* '20....JASCE 19 Florentine Gardens Asst Civil Engr Miranda Sugar Co [Springfield Mass Central Miranda Oriente Cuba
- Lindsley, Charles W *CE* '07..MASCE 52 E Utica St Oswego Plant Engr Oswego Candy Works Long's [N Y Chocolate Works
- Linton, Orlando H *CE* '06....University Club Montreal Can Vice-President Canadian Comstock Co Ltd Constr Engrs
- Liu, Chi Sheng *CE* '22....PE 3 Elgin Road Shanghai China
- Livatt, Charles D *CE* '17....1413 Grant Ave Bethlehem Pa
- Livermore, Norman B *CE* '95..MASCE San Francisco Calif Pres N B Livermore & Co 1306 Merchants Nat Bank Bldg
- Lo, Chung Chem *CE* '10.....Nan Ying St Foochow China Principal Tangshan Engrg College Tangshan China
- Lo, Ying *CE* '16 JASCE Hae-Don-Hon St Nan Chang China Engr M of W CGR Tientsin Pukow Line Tientsin China
- Lockerby, Robert A *CE* '06..87 St Matthew St Montreal Can Lockwood, Ralph H *CE* '73.....6323 Lakewood Chicago Ill Retired

- Loeffler, Hermann C CE '16 21 McKinley Ave Glendale N Y
Civil Secy Citizens Union 41 Park Row N Y C
- Loh, Yuen Chang CE '14..North Chekiang Road Shanghai
Assistant Superintendent of Construction Standard [China
Oil Co
- Long, Arthur M CE '12.....122 Porter Ave Warren O
Asst Gen Mgr Sales Dept The Trumbull Steel Co
- Long, Guy E CE '02.....226 Reynolds St Kingston Pa
Civil Engineer
- Longwell, John S AB CE '10.....AMASCE Powell Wyo
Mgr Shoshone Proj U S Reclamation Service
- Loomis, Arthur B BS MCE '94.....Toledo O
Chief Engr Structural Dept Toledo Bridge Crane Co
- Loomis, Van Wyck W CE '14.....Attica N Y
Stock Slsmn Bell Tel Securities Co 195 Brdwy N Y C
- Loomis, Willis H CE '94.....28 Rock Island St
Pres W H Loomis Talc Corp Gouverneur N Y
- Lopez, Carlos CE '09.....Iloilo Iloilo P I
Surveyor 34 Yznart St
- Lord, Charles H CE '11 MAWWA Crescent Park Ogden-
Superintendent City Water Works [burg N Y
- Lord, George W CE '20.....1550 Ashland Ave Evanston Ill
c/o So California Edison Co Los Angeles Calif
- Lordly, Henry R CE '93 MCE '20.....MASCE MEIC 74
Cons Engr Montreal P Q Can [Strathearn Ave
- Lott, Henry D CE '15.....370 E 23d St Brooklyn N Y
Field Engr Post-McCord Construction Co N Y C
- Love, Albert J CE '09.....92 Downer Place Aurora Ill
Vice President Love Brothers Inc
- Loveland, Chester H CE '10..2730 Garber St Berkeley Calif
Cons Engr Merchants Exchange Bldg San Francisco Calif
- Lovell, Earl B CE '91.....AMASCE 160 Broadway N Y C
Prof Civ Engrg Col Univ Mgr & Chf Engr E & S Dept
Lawyers Title & Tr Co Vice-Pres Charles Hansel Co
- Lu, En Hsu MCE '22..23 Ta Sha Mao Hsian Nanking China
Lu, Feng Shu CE '18..MChES Wushih City Kiang-Su Pro
Naugard Ry & Mining Coll Shanghai China [China
- Lucchetti-Otero, Antonio S CE '10..AMASCE San Juan P R
Asst Chief Engr P R Irrigation Service Guayama P R
- Lucchetti, Raul CE '20.....c/o Ledo Manuel Toro Ponce P R
Asst Engr P R Irrigation Service San Juan P R
- Ludlow, J Wyman ME CE '03 MASCE ME&AAS 552 12th St
Harbor Engineer Port of Los Angeles City Hall San Pedro
Calif
- Lum, Paul B CE '07.....MSAE Washington D C
Mgr Autocar Sales & Service Co 1240 Penn Ave NW
- Lund, Gabriel E CE '17..AMASCE c/o J H Early 25 Pine
[St New York City
- Lyerly, Charles A Jr CE '09 4487 McPherson Ave St Louis Mo
Lyle, Alexander Jr CE '13.....61 W 50th St New York City
Assistant Engineer H D Best & Co Flatiron Bldg
- Lyman, Richard R BS MCE '03 PhD '05 AMASCE Salt Lake
Prof Civil Engrg Univ of Utah Pres [City Utah
- Lyman-Callister Co
- Lynch, Edmund CE '12 MAAE 44 Hawthorn Ave Crafton Pa
San Engr Amer Sheet & Tin Plate Co Pittsburgh Pa
- Lynch, James H Jr CE '19 MAAE 237 Plymouth Ave Buffalo
Office Engineer Erie R R Hornell N Y [N Y
- MacBean, John P Jr CE '20.....Lawton Ave Oak Lane Pa
City Engr's Office St Petersburg Fla
- MacDiarmid, Milo S CE '95 MASCE MDeES Northville Mich
Asst Engr U S L S 205 Old Custom House Detroit Mich
- MacDonald, Harold G CE '07.....Edmonton Alberta Can
- MacGregor, Ross E CE '18.....109 Rogen Ave Brooklyn N Y
With N J D W S Comm Wanaque N J
- MacHarg, John B CE '93 AB PhD..414 W 121st St Rome NY
Professor of History Lawrence Coll Appleton Wis
- MacKellar, Gordon CE '20.....147 No Church St Hazelton Pa
Desnr & Draftsman Luzerne Co Road & Bridge Dept
Wilkes-Barre Pa
- MacKen, Harold I CE '20..62 Westervelt Ave New Brighton
N Y Tel Co 15 Dey St New York City [N Y
- MacKrell, Edwin A CE '12.....971 E 18th St Brooklyn N Y
Engr D L & W R R Hoboken N J
- MacLeod, Norman L CE '11..4947 Kimbark Ave Chicago Ill
Assistant Nearner Ager & Lord Tie Co 80 E Jackson Blvd
- MacMannis, Thomas E CE '22..66 rBoadway Frostburg Md
- MacVeagh, Wayne CE '16 472 Hepburn St Williamsport Pa
Teacher Vocational School Coatesville Pa
- McArthur, Joseph W MCE '17.....MAAE 1873 Garden St
Bridge Engineer Lane County Ore [Eugene Ore
- McCarthy, John R CE '17..4761 Richardson Ave New York
Jr Engr Crew Levick Co Philadelphia Pa [City
- McCaustland, Elmer J CE MCE '97.....MASCE MECISL
Dean of Engrg Dir Engrg Exp Sta Univ of [MAAE
Mo Columbia Mo
- McClain, Carl A CE MCE '16 MAAE AMASCE 1033 High St
Genl Supt & Sec Eugene Water Board Eugene Ore
- McClatchy, John B CE '22.....Merion Pa
Builder 848 Land Title Bldg Philadelphia Pa
- McClintock, Ward G CE '13.....108 E Marshall St Ithaca N Y
Engineer Dept Bldgs & Grounds Cornell Univ
- McClure, John H CE '19.....928 Western Ave Pittsburgh Pa
Draftsman Pittsburgh-Des Moines Steel Co
- McClure, Ross G CE '16 MAAE 208 N Calif Ave Chicago Ill
Engrg Dept Western El Co Hawthorne Ill
- McConnell, Ira W CE '97.....MASCE MAAE MBosSCE
V-P Dwight P Robinson & Co Inc 125 E 46th St N Y C
- McCormick, J Gould CE '10..909 Main St Monongahela Pa
- McCrone, Walter C CE '14.....St Johnsville N Y
Milling Business
- McCurdy, George E CE '05.....Berwyn Ill
316 Wildwood Ave Akron Ohio
- McCurdy, John C BS CE '12.....Forest Home Ithaca N Y
Professor Rural Engrg Coll of Agr Cornell University
- McDermott, Thomas C CE '22 46 Hancock St Stoneham Mass
Cost Engr F T Ley Co Inc Ithaca N Y
- McDowell, Edwin T CE '14..77 So Main St Middletown Conn
Superintendent of Public Works Norwood Mass
- McGowan, Henri C BS EE CE '17 2624 Walton Way Augusta
Sales Engr H W Johns-Manville Co 210 No Broad St [Ga
Philadelphia Pa
- McHarg, Leslie CE '99..AMASCE 144 Westside Ave Free-
Pres & Treas McHarg-Barton Co 1328 Broadway [port N Y
New York City
- McHugh, Austin G CE '14.....71 Aldrich St Buffalo N Y
Draftsman Youngstown Sheet & Tube Co Youngstown O
- McKaig, Thomas H BArch CE '13.....Orchard Park N Y
Architectural Engineer
- McKee, William J CE '09.....308 Western Ave Aspenwall Ia
- McKee, Edward P CE '22.....1642 Dickson Ave Scranton Pa
- McKeever, William CE '98..MAGasInst MIES 12 Wash Ave
Cons Engr 34th & Chestnut Sts [Spring Lake N J
Philadelphia Pa
- McKinstry, Ross W CE '18..JASCE 5131 Kimbark Ave Chi-
Str Engr 101 Fourth St Hinsdale Ill [cago Ill
- McKown, Howard P CE '09.....4139 Franklin Road
Construction Engineer Carbon Steel Co Pittsburgh Pa
- McLeod, Donald F CE '07.....MASCE MSPEE
Prof Mun Engrg Univ of Miss University Miss
- McLoughlin, A Vincent CE '20..54 Liberty Ave New Rochelle
[N Y
- McMath, Neil C CE '14.....MDES 1023 Parker Ave Detroit
Mgr Buhl Stamping Co Walkerville Ont Can [Mich
- McMillin, Edwin R CE '17 203 Savannah Ave Wilkesburg Pa
Engineer Pittsburgh Bridge & Iron Works Rochester N Y
- McNair, George H-S CE '18.....719 W 180th St N Y C
N Y Telephone Co Essex Falls N J
- McPherson, Kenneth W CE '09.....Castle Shannon Pa
Engineer Pittsburgh Railway Co
- Ma, Yu Chi CE '19.....Liau-a-au Amoy China
San Engr West Palm Beach Fla
- Maahs, Arthur J CE '22..1637 Quarrier St Charleston W Va
- Maas, Charles L CE '15.....5848 Florence Ave Phila Pa
Prod Engr United Gas Improvement Co Broad & Arch Sts
- Macedo, Jose B CE '17 Avendo Rio Branco 60 Rio de Janeiro
Engineer for Coal Mining Co [Brazil
- Mack, Harry E CE '01.....Box 2 Marathon N Y
Engr and Draftsman American Road Machinery Co Inc
- Mackenzie, Donald A CE '17 S Lexington Ave White Plains
[N Y
- Mackintosh, William CE '96..1213 W 16th St Oklahoma City
Mackintosh Walton Co Cons Engrs State National [Okla
Bank Bldg
- Macleish, Gordon G CE '12..Box 24-A RFD LaHabra Calif
Engineer LaHabra Heights Co
- Macpherson, David J CE '77 ..1120 Atchison St Pasadena
Retired [Calif
- Macy, Frank H CE '10.....26 Eighth St Hudson N Y
Asst Civil Engr N Y State Conservation Comm Albany N Y
- Macy, Paul CE '13.....MAAE 43 Raines Park Rochester N Y
Repr Tarvia Dept The Barrett Co
- Madden, William F CE '21.....16 Hubbard St Cortland N Y
Asst Engr N Y State Hwy Comm Hornell N Y
- Madigan, Francis W CE '07..460 Maplewood Ave Rochester
Assistant Engineer Dept State Engineer and Surveyor[N Y
- Magsaysay, Ambrosio CE '09..421 Calle Paz Paco Manila P I
Asst Mgr Yangco Steamship Co St Muelle Industria
- Maher, Paul L CE '13..MSIndE 73 Coolidge St Brookline
[Mass
- Mahoney, Lee C AB CE '12.....3135 Pacific Ave
Estm Engr Bldg Constr 1011 Bush St San Francisco Calif
- Maier, Edward L CE '21 2206 Minn Ave S E Washington D C
Jun Civil Engr U S Engrs Off Old Land Off Bldg
- Mallery, Clarence S CE '89.....412 Front St Owego N Y
Pres Binghamton Bridge Co 1104 Press Bldg Binghamton
N Y

- Mallery, John S *CE* '16.....412 Front St Owego N Y
Ch Engr Binghamton Bridge Co 1104 Press Bldg Binghamton N Y
- Mallison, Charles H *CE* '07....1012 High St Pottstown Pa
Acting Mgr of Erection McClintic-Marshall Constr Co
- Malone, George E *CE* '03....521 No Eleventh St Reading Pa
- Maltby, Albert E *CE* '76 LLD Phd MillistSWPa 507 Stewart
Teacher in College Grove City Pa [Ave
- Mambert, Stephen B *CE* '08 487 Berkeley Ave So Orange N J
Vice Pres & Finan Exec Thos A Edison Co E Orange N J
- Manchester, Wilbur O *CE* '20.....Nassau N Y
Deck Off USC&GS Washington D C
- Mann, Joseph S *BS CE* '12.....Fairchild N C
Chf Engr Coastal Land & Devp Co New Holland N C
- Mann, Louis M *CE* '77.....MWeSE Milwaukee Wis
Assistant Engineer U S Engineer Office Federal Bldg
- Mann, Matthew D Jr *PhB CE* '08..625 Locust St Roselle N J
Supt Chem Prod Div Standard Oil Co Elizabeth N J
- Mann, Roberts J *CE* '13 *MCE* '14..629 Moss Ave Peoria Ill
Mao, Thomson *MCE* '17.....
Asst Principal Tangshan Engrg Coll Tangshan China
- Marks, A Lester *CE* '15.....c/o Constr Q M Honolulu T H
Engineer Construction Q M Pahala T H
- Marsh, Clarence W *CE* '94.....MAIChE MACHS MAES
Cons Engr 101 Park Ave New York City [Greenwich Conn
City
- Marston, Anson *CE* '89.....MASCE MWeSE Ames Ia
Dean of Engrg Iowa State Coll Mem Iowa State Hwy
Comm
- Martens, James H C *CE* '21.....Shrub Oak N Y
Instructor Geol Dept Cornell Univ Ithaca N Y
- Martin, Charles E *CE* '21..150 Selye Terrace Rochester N Y
Cadet Engr Public Service Gas Co Newark New Jersey
- Martin, J Ward *CE* '19.....3138 Sheridan Road Chicago Ill
- Martin, William F *MCE* '06..AMASCE 1054 Mariposa Ave
Asst Prof Mech Engrg Univ Calif Cons Engr Berkeley
Calif
- Marvin, Ralph E *CE* '03 c/o Dr F L Marvin Muskegon Mich
Civil Engrg & Mining 306 London Bldg Vancouver B C Can
- Marx, Charles D *CE* '78.....MASCE MWeSE MAICE
Prof C E Leland Stanford Jr Univ Cons Engr Stanford
University Calif
- Marx, Erwin *CE* '00....2562 Observatory Ave Cincinnati O
Prod Mgr The G A Gray Co Gest & Depot Sits
- Masters, Frank H *AB CE* '04 MAREA MWeSE 407 Glen-
Asst Chief Engr E J & E Ry Co Joilet Ill [wood Ave
- Mauer, William J *CE* '09..MAAE 2624 Central St Evanston
Sales Repr Wm J Mauer Co 327 So LaSalle St [Ill
Chicago Ill
- Maxeiner, Carl A *CE* '18.....486 Yates St Albany N Y
- Maxon, Paul J *CE* '13.....50 Palisade Ave Bogota N J
Genl Supt National City Realty Corp 55 Wall St N Y C
- Maxwell, Donald P *CE* '07..1004 Baltimore Ave Dormont Pa
Concrete Engr Aluminum Co Amer Oliver Bldg Pittsburgh
Pa
- Maxwell, Frank A *CE* '78 *MCE* '79.....Georgetown Colo
Deputy County Treasurer Clear Creek Co
- Mayhew, Robert *CE* '94..2 Daggett Terrace Schenectady N Y
Machinist
- Maynard, Henry W *CE* '07 MNACA 3089 Broadway N Y C
Cost Acct Scovell Wellington Co Pub Accts 27 William St
- Mayo, Geoffrey W *CE* '07.....AMASCE Smethport Pa
Sen Hwy Bridge Engr 501 Wheat Bldg Ft Worth Tex
- Mead, Daniel W *CE* '84.....MASCE MASME MAIConsE
Cons Engr & Prof Hyd San Engrg Univ Wis Madison Wis
- Mead, Robert G 2nd *CE* '17.....Ossining N Y
Promotion and Development
- Mead, Theodore L *BCE* '77 *CE* '90..MPhilaAcadNSe Oviedo
Horticulturist [Fla
- Mechan, John W *CE* '87.....MPNWSE Mt Vernon Wash
City Engineer
- Meikle, A Craig *CE* '15.....3115 Clifton Ave Baltimore Md
Res Engr Norton Bird & Whitman 616 Munsey Bldg
- Meissner, Charles R *CE* '12....45 Lenox Road Brooklyn N Y
Exp Engr Seabord By-Product Coke Co Jersey City N J
- Mellen, Arthur W Jr *CE* '17.....2676 Morris Ave N Y C
Brooklyn Crozite Brick Corp E NY & Utica Ave Brooklyn
N Y
- Mellor, Alfred R *CE* '12..52 Bay State Ave W Somerville
Asst Engr Comm on Pub Works State House [Mass
Boston Mass
- Menefee, Ferdinand N *BS in CE CE* '10 AMASCE Ann Har-
Prof Engrg Mech Univ of Mich V-Pres United [bor Mich
Engrg Corp
- Mengers, Charles A *CE* '15.....MECIB 3145 S Atlanta Rd
Desnr U G I Contr Co Broad & Arch Sts [Camden N J
Philadelphia Pa
- Menocal, Mario G *CE* '88....Calzada Esqa I Vedado Havana
[Cuba
- Merrill, Thomas D *CE* '78..2625 Greysolon Rd Duluth Minn
Lumber Dealer 210 First National Bldg
- Mershon, Edward J *CE* '14..AMASCE 27 Spring St Brock-
Contr Engr Pittsburgh-Des Moines Steel [port N Y
Co 807 Curry Bldg Pittsburgh Pa
- Meston, Robert S *CE* '16.....501 Clara Ave St Louis Mo
Repr Standard Oil Co of N Y Johannesburg So Africa
- Metzger, Harold N *CE* '07..166 Lancaster Ave Buffalo N Y
Member Metzger Construction Co 676 Genesee St
- Meyer, August B *CE* '14.....759 E 17th St Brooklyn N Y
- Meyer, Henry R J *BS MS CE MCE* '14..MAAE AMASCE
City Engineer Box 144 Havre Mont
- Meyers, Clarence W *CE* '02 *MCE* '03..314 Riverside Drive
[N Y C
- Michaelson, Joseph *CE* '92..1234 Girard St N W Wash D C
Desng Engr Bureau Yards and Docks Navy Dept
- Michelson, Benjamin C *CE* '19 1870 Wyoming Ave Wash D C
McClintic-Marshall Constr Co Pittsburgh Pa
- Middleton, Cornelius W *CE* '16..MSNA&ME Sound Beach
Engr Babcock & Wilcox Co 85 Liberty St N Y C [Conn
- Mildon, Reginald B *CE* '00.....Lansdowne Pa
Asst to Vice Pres Westinghouse Electric Mfg Co Lester Pa
- Miles, Hamilton V *CE* '08.....Cornell Heights Ithaca N Y
Manager Wisteria Tea Garden
- Milhan, David N *CE* '15.....AMASCE MASTM Sodus N Y
Asst Constr Engr Sinclair Refining Co Fowler Colo
- Miller, Bruce McC *CE* '03....800 No Canal St Pittsburgh Pa
Draftsman Jones & Laughlin Steel Co
- Miller, George *CE* '17.....
Civil Engr Hwy Dept Baldwin Loco Works Phila Pa
- Miller, Granbery *CE* '13....4500 Euclid Avenue Cleveland O
Drummond-Miller Co General Contractors
- Miller, Harold G *CE* '17....512 Greenwich St Reading Pa
Vanity Fair Silk Mills
- Miller, John H *CE* '12.....238 Argyle Road Brooklyn N Y
N Y Sales Repr Irving Iron Works Co N Y C
- Miner, James H *CE* '00..MAAE AMASCE Bellair Dr Dobbs
Estimator D P Robinson & Co 125 E [Ferry N Y
46 St N Y C
- Minnix, Allen C *CE* '15.....1820 K St Washington D C
Builder
- Mirick, Alfred S *CE* '10..AMASCE 1421 G St Lincoln Neb
Cons Engr Hershey & Mirick 307 Brownell Bldg
- Miscall, Leonard *CE* '19 MAAE 845 Clinton Ave Albany N Y
N Y State Highway Department
- Mitchell, Charles M *CE* '22....58 W 59th St New York City
- Mitchell, Louis A *CE* '02....MASCE MAREA P O Box 235
Engr M of W Union Traction Co of Ind Anderson Ind
- Modjeski, Charles E J *CE* '21 222 So Michigan Ave Chicago
[Ill
- Moeller, Henry L *CE* '07..AMASCE 20 Bellevue Ave Wee-
Chf Engr Martini & Humeke Co of America [hawken N J
1201 Hudson St Hoboken N J
- Mollard, Charles E *CE* '01.....AMASCE Skaneateles N Y
Structural Engr American Bridge Co Pittsburgh Pa
- Monaghan, Thomas A *CE* '17.....460 W 142d St N Y C
- Monge, M Arturo *CE* '04..MNatSCE Buenos Aires Arg Rep
Gen Insp National Comm Bridges & Roads
- Monk, Percy S *CE* '10 MAAE AMASCE 608 So Dallas Ave
Asst Engr Benno Janssen 802 Century Bldg Pittsburgh Pa
- Montgomery, James J *CE* '03 33d St & Haverford Ave Phila
[Pa
- Monroe, Robert L *CE* '22.....26 Benton St Trenton N J
Str Steel Draftsman Amer Bridge Co
- Moomaw, Dalton *BS CE* '09..MASCE MCIES 1121 Blaine
Engr Mgr Seaman Constr Co [Ave So Bend Ind
Goshen Ind
- Moore, A Kenneth P *CE* '17..209 Walnut St Montclair N J
Engr Gas Equipment Corp
- Moore, Charles B *CE* '16.....MAAE Box 324 Marion Ala
- Moore, Egbert J *CE* '99..MASCE 397 N Brdy Yonkers N Y
Vice-Pres Turner Constr Co 244 Madison Ave N Y C
- Moore, Frank C *CE* '92..MASCE 9130 115th St Richmond
Asst Engr Amer Br Co 30 Church St N Y C [Hill L I
- More, Charles C *MCE* '99....AMASCE 4545 Fifth Ave N E
Prof C E & Head of Dept Univ of Wash Seattle Wash
- Morelos, Jose R *CE* '22.....1127 Aceyteros St Manila P I
- Morgan, J Holloway *CE* '13..70 W 164th St New York City
Securities Salesman E L Stock Co Washington D C
- Morgans, Howard K *CE* '07..760 Commonwealth Ave Detroit
Superintendent for Builder [Mich
- Morris, Abraham M *CE* '22..289 E 98th St New York City
- Morris, Garfield T *CE* '04 MAAE 319 Sta Clara Ave Alameda
Off Engr Bur Val I C C 731 Wells Fargo Bldg [Calif
San Francisco Calif
- Morris, Philip *CE* '12..1609 W Venango St Philadelphia Pa
Gen Mgr Workmen Homes Co Passaic N J
- Morris, W Harley *CE* '09....MBRECI Port Washington N Y
Asst Engr Transit Constr Comm 49 Lafayette St N Y C

- Morton, John W *CE* '19....200 A St S E Washington D C
 Mosher, Sidney W *CE* '17.....Poplar Ridge N Y
 Jun Asst Engr Bronx Parkway Comm Bronxville N Y
 Moss, Berkeley N *CE* '93....6605 Franklin Ave Hollywood
 Civil Engineering and Land Developing [Calif
 Mosserop, Alfred M *CE* '85.....MASCE Mir&S1 (London)
 Cons Engr 36 E Boulevard Rochester N Y
 Mueden, George F *CE* '05.....
 Asst Engr N Y State Pub Service Comm N Y C
 Muench, William O Jr *CE* '12....5221 Chester Ave Phila Pa
 Mulhearn, Lawrence J *CE* '13.....Bronxville N Y
 c/o N Y C R R
 Mullen, Frederick B *CE* '17....448 Hillside Ave Jamaica N Y
 Butler Bldg
 Muller, Leslie *CE* '96.....AMASCE Shelton Wash
 Mulliken, Alfred *CE* '18....c/o Mrs Zell The Walbert No
 Asst Sanitarian Div of San Albany [Charles St Balto Md
 N Y
 Munisteri, Philip *CE* '20.....78 Starr St Brooklyn N Y
 Munn, Harvey T *CE* '13 AMASCE MAAE 1833 S St N W
 235 Merrian Block Council Bluffs Ia [Wash D C
 Munnikhuysen, Walter F *CE* '15.....Bel Air Md
 Field Engineer H Koppers Co Sault Ste Marie Ont Can
 Munos, José del C *CE* '91.....Rivas Nicaragua C A
 Pres of Board of Public Instruction
 Murphy, Edward C *CE* '84 MS MCE '00....MASCE, Napa
 Hydraulic Engineer U S Geological Survey [Calif
 Murray, Clare D *CE* '07.....AMASCE DeRuyter N Y
 Highway Contractor
 Mussi, Angelo P *CE* '08 MRES 1909 E Main St Rochester NY
 Inspector Dept of Engrg City Hall
 Nagle, James C MCE '93.....MASCE MAAE Dallas Tex
 Nagle Witt & Rollins Engrg Co
 Nagler, Salyg *CE* '18.....224 Ave B New York City
 Jun Engr Ford Bacon & Davis 577 W 177th St
 Nakamoto, Goichi *CE* '17.....Hilo Hawaii T H
 Asst Engr Pacific Engrg Co Honolulu T H
 Nambu, Tsuneriro MCE '88.....MJSCE Aomori City Japan
 Chief Engr Aomori Harbor Improvement Chikkajimusho
 Names, Sewell *CE* '12....MAAE 194 Newfield St Buffalo N Y
 General Contractor
 Nash, Jack T *CE* '16.....1604 Eighth Ave Fort Worth Tex
 Chief Office Engr Henry Evald Elrod Co Dallas Tex
 Natanson, Walter E *CE* '13.....
 c/o American Consul Barranquilla Colombia S A
 Neafie, William O *CE* '20.....1833 Mt Vernon St Phila Pa
 Res Mgr Wooster Thomas & Co Securities
 Needle, Joseph *CE* '20.....547 King St Charleston S C
 Nelson, Elbert J *CE* '07.....Okeechohee Fla
 Engr Fla State Road Dept
 Nelson, Harry M *CE* '08.....E Ryegate Vt
 Nelson, John I *CE* '12 c/o F S Denneen 9716 No Blvd Clevel-
 land Ohio
 Neshit, Edgar D BS in *CE* '12.....Jonesboro Ind
 County Surveyor of Jasper Co Rensselaer Ind
 Nesbit, Elmer C BS in *CE* '12.....Jonesboro Ind
 Engineer Smith & Thompson Contractors Witoka Minn
 Nethercot, David G *CE* '20....MWSE 518 Cherry St Winetka
 With Hill Clarke & Co Machinery Merchants [Ill
 Chicago Ill
 Neu, Edgar W *CE* '21.....1081 Jefferson St Buffalo N Y
 Neumaier, Martin *CE* '16....1417 Grand Concourse N Y C
 Civil Engineer War Dept Columbia S C
 Neville, Colon W J BS MCE '01.....MASCE
 Contr Engr Elks Club New Orleans La
 Newbold, Thomas T *CE* '14....202 Macon St Brooklyn N Y
 Supt Raymond Cone Pile Co 140 Cedar St New York City
 Newkirk, Arthur D *CE* '15 MAAE 415 E Third St Jackson-
 Asst Engr Georgia State Hwy Dept Natl [ville Fla
 Bank Bldg Savannah Ga
 Newman, Thomas S *CE* '03.....905 No Alabama Ave
 Engr & Geologist The Newman Co Box 188 Okmulgee Okla
 Nickerson, G Lloyd *CE* '14....MAAE Box 262 Middletown N Y
 Highway Engineer P O Box 104 Poughkeepsie N Y
 Nickerson, Paul U *CE* '22.....49 Warren St Needham Mass
 Nisenson, Amos O *CE* '10 AMASCE 5 Hillside Ave Newark
 Civ Engr & Survr Lake & Nisenson 9 Clinton St [N J
 Nitchie, Francis R AB '06 *CE* '10.....
 Noble, Henry J *CE* '09.....325 Fenn St Pittsfield Mass
 Norton, George H *CE* '87....MASCE 62 Tillinghast Place
 City Engineer 20 Municipal Bldg Buffalo N Y
 November, Nathan C *CE* '19....270 New York Ave Brooklyn N Y
 Deck Off U S C & G S USS Ranger San Juan P R
 Nussbaum, Walter E *CE* '15....128 S First St Lehighton Pa
 Mun Engr Palmer Land Co Palmerton Pa
 Nye, Algernon S *CE* '8.....351 W 51st St N Y C
 Ober, John I *CE* '16.....143 Abercom St Savannah Ga
 c/o Dwight P Robinson Co 125 E 46th St New York City
 Oboza, Alfonso G *CE* '22.....Bani Pangasinan P I
 O'Brien, Earl F *CE* '20.....127 Freeman Ave Solvay N Y
 O'Brien, James B *CE* '11.....41 So Second St Steelton Pa
 Civil Engr Central Hershey Prov Havana Cuba
 O'Connor, Bernard *CE* '13.....168 Ash St Watertown N Y
 Manager Standard Oil Co Sacramento Calif
 O'Connor, F Barnard *CE* '13....AMASCE 1 Lexington Ave
 Asst Chf Engr Alphons Custodis Chim Const Co [N Y C
 Bennett Bldg
 Odessy, Herman P *CE* '21....105 Stockton St Brooklyn N Y
 c/o USC&GS Washington D C
 Ogden, Henry N *CE* '89....MASCE 614 University Ave Ithaca
 Prof San Engrg School of Civil Engrg Cornell Univ [N Y
 Mem Pub Health Council N Y State
 Ogelsby, Hart D *CE* '12....MESPa 31 So Front St Harrisburg
 Engineer State Highway Dept Erie Pa [Pa
 Ogier, George R *CE* '08.....928 Detroit St Denver Colo
 Civil Engineer
 Ohrt, Frederick *CE* '11.....AMASCE Courtland Hotel
 City & Co Engr Honolulu T H
 Olds, Thomas H BS *CE* '07....AMASCE 2347 Elm St Denver
 Civil & Hydr Engr First National Bank Bldg [Col
 O'Leary, James H *CE* '19....23 Wall St North Adams Mass
 Transitman N Y C R R Watertown N Y
 Olin, Franklin W *CE* '86....MASME 1128 State St Alton Ill
 Pres Western Equitable & Egyptian Powder Cos & West-
 ern Cartridge Co
 Ollason, Peter *CE* '02.....Watsonville Calif
 Olmstead, Charles H *CE* '16 AMASCE MAAE 327 7th Ave N
 Division Engineer State Highway Dept Nashville Tenn
 Olney, Willard W *CE* '79.....Bay Minnette Ala
 Locating Engineer
 Onstott, Virgil S *CE* '21.....Saltsburg Pa
 O'Reilly, Francis S *CE* '09.....619 Tracy St Utica N Y
 25 Nassau St New York City
 O'Rourke, Bernard J *CE* '10....AMASCE 815 Madison St
 Engr & Contr O'Rourke Bros 430 Walnut [Syracuse N Y
 St Phila Pa
 O'Rourke, Charles E *CE* '17....450 St Nicholas Ave N Y C
 Instructor Bridge Engrg Cornell Univ Ithaca N Y
 O'Rourke, Frank H *CE* '12....AMASCE 815 Madison St
 Engr & Contr O'Rourke Bros 430 Walnut [Syracuse N Y
 St Phila Pa
 Ormsby, Frank W *CE* '81....46 W Cayuga St Oswego N Y
 Civil Engineer West First St
 Orr, Raymond C *CE* '22....400 Classon Ave Brooklyn N Y
 Osborne, Alfred B *CE* '03.....Oneida N Y
 Engineer with Larkin Co 31 Remoleno St Buffalo N Y
 Ostrom, John N *CE* '77....MASCE MAREA East Randolph
 Cons Br Engr C B & Q R R 208 So LaSalle St [N Y
 Chicago Ill
 Otero, A Lucchetti (See Lucchetti)
 Ourand, William R *CE* '09.....4205 Eastway Toledo O
 Willys-Overland Co
 Owen, Elijah H PhB *CE* '99....AMASCE 390 Lawrence Ave
 Ind Engr Owen & Sea Brook 404 McKerchey Bldg Detroit
 Mich
 Owens, Harold V *CE* '05....AMASCE 127 Thomas St Utica
 Secy and Treas Dale Engrg Co Genl Contrs [N Y
 Paaswell, George *CE* '08.....MASCE 212 W Fordham Rd
 Sect Engr N Y State Public Service Comm N Y C
 Pacello, Vincent J *CE* '17....54 Travis Ave Port Chester N Y
 Desng Engr Elyyn E Seelye Cons Engr 101 Park Ave New
 York City
 Packard, Daniel B AB *CE* '04....219 So Coit St Florence S C
 Asst Val Engr Atlantic Coast Line R R
 Páez, José *CE* MCE '13.....MPhIE&A Malabon Rizal P I
 Director Bureau of Public Works Manila P I
 Page, Blinn S *CE* '14....1530 Burlingame Ave Detroit Mich
 Salesman Carnegie Steel Co 1815 Ford Bldg
 Page, William H *CE* '83....1556 W Collin St Corsicana Tex
 Engineering and Farming
 Palacio, Felipe G BS *CE* '09....4 Calle de Luccina Mexico
 [City Mex
 Palmer, Charles D *CE* '22.....306 E Seventh St Erie Pa
 Palmer, Marshall B *CE* '95....AMASCE 104 Amherst Ave
 Cons Engr City Engrs Office Syracuse N Y
 Palmer, Ray S *CE* '97 DDS 41 St Pauls Place Brooklyn N Y
 Dentist
 Pan, Chu-Hung MCE '21.....Wuchow Kwangsi China
 Pantón, Edward C *CE* '14....AMASCE c/o I C Bement Ithaca
 Engr U S Rec Service King Hill Idaho [N Y
 Parker, Gilbert E *CE* '16....820 5th Ave Cedar Rapids Ia
 Capt U S A Tank School Camp Meade Md
 Parkhurst, Roger W *CE* '13....AMASCE 22 S Portland Ave
 Conn & R I Repr Barber Asphalt Co 1609 [Brooklyn N Y
 Woolworth Bldg N Y C

- Parmenter, Richard *CE* '17.....Box 366 Geneva N Y
Sec Société Anonyme des Automobiles (Pierce Arrow)
Paris France
- Parsons, Herbert *CE* '91.....635 W 62d St Chicago Ill
Civil Engineer
- Pascual, Vicente *CE* '21.....Aravat Pampanga P I
Asst Civil Engr Bureau of Public Works Manila P I
- Paterson, Charles J *CE* '07.....3060 Coleridge Rd Cleveland
President The Paterson Leitch Co Cleveland O [Heights O]
- Patrick, Arthur S *CE* '15.....109 Hobart St Utica N Y
With The Texas Oil Co 509 E Fifth St Brooklyn N Y
- Patten, Harry A *CE* '07.....New Bern N C
Farmer
- Patten, William E Jr *CE* '11.....401 Conklin Ave Binghamton
Prof Hydr Engrg Tangshan Engrg Coll Tangshan [N Y
China]
- Patterson, Burke *CE* '22.....438 Franklin Ave Wilkesburg Pa
Patterson, Harold J *CE* '11.....1070 Carroll St Brooklyn N Y
- Paulus, Roy *CE* '08.....342 State St Flushing N Y
Paulus-Ullman Printing Corp 295 Lafayette St N Y C
- Paz, Louis *CE* '93.....Pinalejo Honduras C A
- Pearse, Henry B *CE* '13.....10801 Earle Ave Cleveland O
Real Estate Development and Building
- Pearson, Edward J *CE* '82.....MASCE MAREA Hotel Taft
Pres N Y N H & H R R Railroad Bldg New Haven Conn
- Peebles, Stuart L *CE* '11.....9 Essex St Orange N J
Asst to Mgr Atlantic Gulf & Pacific Co N Y C
- Pei, I-Hsiang *MCE* '20.....MSSch MESCh JASCE Hunt St
Prof Mun Engrg Chiao Tung [Luchowfu Anhui China
Univ Tangshan China]
- Pendergrass, Robert A *CE* '00 *MCE* '01 MASCE 409 Pem-
Asst Gen Mgr McClintic-Marshall [broke Rd Cynwyd Pa
Co Philadelphia Pa]
- Pendleton, Claude M *CE* '18.....Port Dickenson N Y
Instr School of Civil Engrg Cornell Univ Ithaca N Y
- Pendleton, Hunter Jr *CE* '22.....16 Letcher Ave Lexington Va
- Penfield, George W *CE* '00.....MCnSCE New Hartford Conn
Asst Engr Board of Water Comms Hartford Conn
- Pennywitt, John *CE* '15.....419 Lloyd St Pittsburgh Pa
- Perkins, Albert H *CE* '93 *MCE* '94 MASCE MAIBSCE Al-
Div Eng Chief Div Waters N Y Conservation [bany N Y
Comm]
- Perkins, Frank K *CE* '12.....110 So Tenth Ave Mt Vernon N Y
- Perkins, Nelson S *CE* '15.....110 So Tenth Ave Mt Vernon N Y
- Perlman, David *CE* '19 608 Louisiana Ave N W Washington
U S Coast & Geodetic Survey [D C]
- Perry, Arthur F Jr *CE* '16.....1202 Riverside Ave Jacksonville
c/o Florida National Bank [Fla]
- Pesant, Louis *CE* '15.....MCuSE, Box 410 Havana Cuba
Str Steel Dept Krajenski-Pesant Corporation
- Phillipson, Robert A *CE* '19 MAAE 175 Main St Ossining NY
- Phillips, Cushing *CE* '17.....1150 84th St Brooklyn N Y
Lieut (J G) CEC USN Norfolk Va
- Phillips, Frederick *CE* '92.....Peterborough N H
- Phillips, John M *CE* '14 AMASCE 509 Laurel Ave Bridge-
Supt & Engr Harrison Engrg & Constr Corp [port Conn
Wichita Kans]
- Philp, Burk K *CE* '10.....MAAE MLEC Box 438 E Lansing
Asst Prof Civil Engrg Michigan Agricultural College [Mich]
- Picker, David H *CE* '13.....554 Seventh St Brooklyn N Y
Sales Engr D & M Patents Co 166 Montague St
- Piddian, Joseph *CE* '11.....1172 President St Brooklyn N Y
Supt Constr E Parkway & New York Ave
- Pierce, George C *CE* '09 c/o Lusk & Thompson Chattanooga
Atlantic National Bank Bldg Jacksonville Fla [Tenn]
- Pierce, Leslie E *CE* '16.....JSAE JASCE 129 Grove St Stam-
Engr Wright Aeronautical Corp Paterson N J [ford Conn]
- Pierce, Orrin J *CE* '13.....Worcester N Y
Junior Asst Engr N Y State Barge Canal Rochester N Y
- Pierce, Paul L *BS CE* '06.....MASCE Birmingham Ala
Cons Engr Am Trust Bldg
- Piersol, John A *CE* '17.....612 Meadow Ave Charleroi Pa
With C H Hurd Constr Engr Indianapolis Ind
- Pinco, Charles N *CE* '03.....1143 Lexington Ave N Y C
Dist Mgr Steel Fabricating Corp 707 Union Bldg Cleveland
Ohio
- Pino, Farrera Francisco Jr *CE* '05 211 W State St Ithaca N Y
Hotel Continental Guatemala City Guatemala
- Piper, William E *BS CE* '09.....199 South Ave New Canaan
Mech & Civil Engineer The Dorr Co 101 Park [Conn
Ave N Y C]
- Pistor, George E J *CE* '01.....MASCE 55 Elstun Rd Upper
Contr Engr Hay Foundry & Iron Works [Montclair N J
15 E 26th St New York City]
- Pitner, Harold L *CE* '13.....786 Park Ave Weehawken N J
Engr Way & Structures N Y & Harlem R R Co N Y C
- Place, Arthur H *CE* '94.....MASCE Blissfield Mich
Engr Bur of Govt Research 542 Griswold St Detroit Mich
- Ploss, Paul *CE* '11.....520 Park Road Ambridge Pa
Ford Motor Co Detroit Mich
- Polack, Waldemar *CE* '21.....201 E 33d St New York City
With Arundel Corp of Baltimore Contrs
- Polak, Henry B *CE* '11.....279 Magnolia Ave Jersey City N J
H B Polak Mfg Co Elect Appliances 10-12 Cook St
- Pologe, Benjamin *CE* '15.....1253 St Nicholas Ave N Y C
Field Engineer The Foundation Co 233 Broadway
- Ponce de Leon, Felipe *AB CE* '10 MCuSE, San Miguel 69 D
Civil Engineer [Havana Cuba]
- Pond, Ben L *CE* '20.....339 E Market St Stockton Calif
- Pons, Francisco *CE* '09.....MACPR MSIPR Santurce P R
Contracting Engineer
- Poole, Ruble I *BE CE* '10.....AMASCE Randleman N C
Civ Engr & Archt Box 830 Raleigh N C
- Pope, Herbert B *CE* '14 209 Washington Ave Haddonfield NJ
Supt Constr Turner Constr Co 244 Madison Ave N Y C
- Porrata-Doria, Francisco L *CE* '13.....35 Marina St Ponce P R
Civil Engineer 3 Mayor St Pvt Office
- Porter, Harry F *CE* '05 MAConel 80 Herral Ave Bridgeport
Actg Genl Mgr Upson-Walton Co 1310 W [Conn
11th St Cleveland O]
- Porter, Percy W *CE* '07.....MAAE Box 36 Wilmington Calif
Asst Engr Harbor Dept City of Los Angeles
- Poss, Victor H *CE* '92.....MASCE 2929 Russell St Berkeley
Cons Str Engr 281 Bush St San Francisco Calif [Calif]
- Potts, Clyde *CE* '01.....MASCE 4 Farragut Pl Morristown N Y
Civil & Sanitary Engineer 30 Church St New York City
- Powell, Charles U *CE* '98.....MASCE Brdwy & Sanford Ave
Engr Top Bur Bor Queens Long Island City [Flushing N Y
N Y]
- Powell, George W *CE* '85.....93 Gorham St Canandaigua N Y
County Engineer
- Powell, Hugh A *CE* '12.....1910 S 16th Ave Birmingham Ala
Office Engineer Alabama Power Co
- Powell, Ralph W *CE* '14.....R D 1 Ionia Mich
Teacher Yale Mission Changsha Hunan China
- Pratt, Avery J *CE* '09.....1246 Hertel Ave Buffalo N Y
Genl Mgr R S McManus Steel Constr Co Inc
- Pratt, Joshua D *CE* '15.....2048 Nunann Ave Honolulu T H
Bureau of Census
- Pratt, Roy E *CE* '21.....36 Elm St Franklinville N Y
Jun Asst Engr N Y State Hwys Buffalo N Y
- Pregler, Anton A *CE* '21.....859 Main St Stamford Conn
Asst Engr Pitometer Co of N Y C Water Works Rep Dept
Rochester N Y
- Prentice, Thomas H *CE* '17.....159 Main St Southington Conn
154 Edgewood St Hartford Conn
- Preston, John O *CE* '17.....
Mgr Prod Order Div Circ Dept Curtis Pub Co Philadelphia
Pa
- Prettyman, J Edward *CE* '19.....Box 149 Seaford Del
Res Engr State Highway Comm Raleigh N C
- Price, W Mitchell *CE* '11.....Overhill Rd Ten Hills Baltimore
Pres and Genl Mgr The Price Constr Co 210 [Md
Maryland Trust Bldg]
- Priester, Oscar F *CE* '17.....2516 Fulton Ave Davenport Ia
Priester Construction Co 1006 Kahl Bldg
- Priester, Walter A *CE* '15.....MDaEC 811 W Seventh St
Genl Contr 1006 Kahl Bldg Davenport Ia
- Proctor, Ralph F *CE* '01.....MASCE 151 W Lanvale St
Chief Engineer Maryland Casualty Co Baltimore Md
- Purcell, Stuart *CE* '01.....AMASCE 1600 Hilton St
Div Engr of Highways 207 City Hall Baltimore Md
- Purdy, George L *CE* '16.....401 Laurens St Olean N Y
Civil Engineer Vacuum Oil Co
- Purdy, Samuel M *CE* '96 MASCE 470 Third St Brooklyn N Y
J G White Engrg Corp 43 Exchange Pl N Y C
- Queral, Raymond *CE* '13.....MCuSE Box 1 Puerto Padre Cuba
Engineer & Contractor Manati Oriente Cuba
- Quinn, John J Jr *CE* '17.....495 Eighth St Brooklyn N Y
General Motors Export Co Broadway & 57th St N Y C
- Quinones, S *CE* '21.....Rio Piedras P R
Dept Interior San Juan P R
- Quinton, Alfred B Jr *CE* '12.....1632 S St N W Washington
Major U S A Ord Dept 130 Lake Ave Newton [D C
Center Mass]
- Quisumbing, Emilio *AB CE* '08 MPIE&A 1020 So Andres St
Desng Engr Irrig Div Bur Public Works Manila P I
- Radford, Charles F *CE* '15.....Hermansville Mich
Civil Engr State Highway Dept
- Raducziner, Joseph *CE* '21.....12 St Paul St Rochester N Y
N Y State Hwy Dept Hornell N Y
- Ragland, Edmond U *BS CE* '14 228 W Fisher St Salisbury NC
- Ramage, William C H *CE* '10.....507 West Ave Mt Carmel Pa
Asst Chief Engr The Brier Hill Steel Co Youngstown O
- Ramirez, Reinaldo *CE* '16.....Cabo-Rojos P R
Asst Engineer Isabela Irrig Serv Quebradillas P R
- Ramsay, James H *BS CE* '13.....75 Hogarth St Toronto Can

- Randolph, Alfred M *CE* '14....8 E Preston St Baltimore Md
Bartlett Hayward Co
- Rapp, George W Jr *CE* '16....1337 Chapel St Cincinnati O
c/o L D Drewry & Co 501 Mercantile Library Bldg
- Rashbach, D Bennett *CE* '12....441 No Prospect St Herkimer
Jun Mem D C & C L Wood Civil Engrs and Surveyors[NY]
- Rasch, Charles J *CE* '10....2846 Guilford Ave Baltimore Md
Asst Res Engr U S Shipping Board Sparrows Point Md
- Rauh, Charles E Jr *CE* '22....207 Central Ave W Hoboken N J
- Rayfield, Frederick H *CE* '15....2 Peachtree Pl Atlanta Ga
- Raymond, Arthur A *CE* '15 MAAE 136 Norwalk Ave Buffalo
Dist Engr 304 Security Bldg Kansas City Mo [N Y]
- Ravnor, Leroy P *CE* '17.....Riverhead N Y
H & G Eng U S C & G S Washington D C
- Read, Jesse E *CE* '81....448 Kosciusko St Brooklyn N Y
Asst Engr Finance Dept Municipal Bldg N Y C
- Read, Willett W *CE* '88....714 Chilton Ave Niagara Falls N Y
Pres Read Coddington Engrg Co 238 Portage Road
- Reardon, Nye B *CE* '05.....466 Guv St Montreal P Q Can
Asst Engr of Buildings Canadian Pacific Ry
- Reck, William M *CE* '14.....416 54th St Brooklyn N Y
Dist Engr Concrete Steel Co Union Bldg Syracuse N Y
- Redwood, John P *CE* '17.....Bay Pond N Y
Civ Engr 30 Rockland St Malone N Y
- Reed, James W *CE* '83....91 Forest Ave Glen Ridge N J
Asst Engr Bd of Estimate & Apportionment Mun Bldg
- Reese, Charles E *CE* '20....249 E Walnut St Westfield N J
541 Main St Norwich N Y
- Regan, Francis A *CE* '21.....966 74th St Brooklyn N Y
- Regula, Albert S *CE* '14....168 Clinton Ave Jersey City N J
Dist Chief Engr Liberty Ins Co 30 E 42d St N Y C
- Reilly, Albert R *CE* '14.....136 Park Ave Watertown N Y
c/o Eastman Kodak Co Kodak Park Rochester N Y
- Reiter, Arthur P *CE* '10.....3 So Grove St E Orange N J
Life Ins Metropolitan Life Insurance Co
- Reitze, Chester N *CE* '05..MASCE MASTM Seattle Wash
Pac Coast Mgr Portland Cement Assn 803 Seabord Bldg
- Rekate, George H *CE* '07.....Lancaster N Y
Automobiles & Farm Machinery 130 Central Ave
- Rensen, Peter *CE* '12.....AMASCE 3609 13th St N W
Engr John J Earley 2131 G St N W Washington D C
- Remy, Jorge F *EM CE* '07.....Pisco Peru
Manager Pisco-Ica R R
- Reppert, Charles M *CE* '04.....MASCE 5538 Bartlett St
Chief Engr Bur of Engrg Dept Pub Wks Pittsburgh Pa
- Requardt, Gustave J *CE* '09.....MASCE 704 Cathedral St
Civil & San Engr 615 Munsey Bldg Baltimore Md
- Reynolds, William W *CE* '06 255 Sidney Ave Mt Vernon N Y
- Rhodes, Leland S *CE* '11.....Lebanon Pa
Asst Prof C E Pa State Coll State College Pa
- Rhodes, O Lynn *CE* '09....222 W Madison St Baltimore Md
- Rhynus, Clarence P *CE* '11.....JASCE
302 Produce Exch Bldg Toledo O
- Rice, John H *CE* '07....194 Main St North Adams Mass
Civil Engr 7th Floor First Natl Bank Bldg Denver Colo
- Rich, Melvin S *CE* '05.....MASCE 1448 Harvard St N W
Cons Str Engr 1410 H St N W Washington D C
- Rickard, Grover E *AB CE* '16.....121 No Claybrook St
Engr Analysts Artesian Water Dent Memphis Tenn
- Rickard, LeRoy S *CE* '06.....MAAE Cobleskill N Y
Asst Engr N Y S Comm of Highways
- Rider, Arthur B *CE* '98.....Rhinelander Wis
Superintendent Construction U S Public Buildings
- Ridgway, Herbert *CE* '15..AMASCE 819 Haddon Ave Cam-
Asst Engr Am Bridge Co 30 Church St N Y C [den N J]
- Riegel, Ross M *CE* '04.....MASCE New Cumberland Pa
Engr West Penn Power Co 14 Wood St Pittsburgh Pa
- Riess, Oscar *BE CE* '09 MIAE 5 1423 Milan St New Orleans
Civil Engineer & Contractor 503 Hibernia Bldg [La]
- Riker, I Russell *CE* '15 MAPHA MNJSA Lawrenceville N J
San Engr State House Trenton N J
- Riley, John H T *CE* '09.....262 Remsen St Cohoes N Y
414 No Third St Philadelphia Pa
- Riley, John P *CE* '22....59 Westminster St Bellows Falls Vt
Asst Engr Parklan Constr Co Glens Falls N Y
- Rindsfoos, Charles S *CE* '06.....AMASCE 126 E 19th St
Secy-Treas Jarrett-Chambers Co 30 E 42d St New York City
- Riple, John W *CE* '93..MASCE 250 State St Flushing N Y
V-P & Treas The Robbins-Ripley Co 50 Church St N Y C
- Ritter, Gilbert P *CE* '97.....1326 Fairmont St N W
Attv at Law (Patents) McGill Bldg Washington D C
- Robartes, Leigh *CE* '09....111 Jones Ave Port Jefferson N Y
Civil and Industrial Engineer
- Roberts, Alan Y *CE* '22....110 Willow Ave Takoma Park D C
- Roberts, Fred W *CE* '17.....1471 High St Denver Colo
Highway Constr 206 Tramway Bldg
- Robey, Kennerly *AM CE* '95 1420 Boulevard Fort Worth Tex
Consulting Engineer and Geologist
- Robinson, Cecil S *CE* '22.....116 Osmun Pl Ithaca N Y
Jun Asst Engr N Y State Hwy Comm
- Robinson, Donald M *CE* '19 448 So Columbus Ave Mt Vernon
[N Y]
- Robinson, George G *CE* '14.....Weedsport N Y
Mgr Lock Joint Pipe Co Ltd Toronto Ont Can
- Robinson, Horace B S *CE* '74....304 Orange St Oil City Pa
Retired
- Robinson, Horace B Jr *CE* '10 1204 Crawford St Houston Tex
Civil Engineer The Texas Pipe Line Co
- Robinson, Melville W *CE* '15.....Winchester Ky
Civil Engineer Cumberland Pipe Line Co
- Rockwell, Fayette L *CE* '14..392 No Main St Wellsville N Y
Vice-Pres & Treas Victor Aluminum Mfg Co
- Rodenhiser, Louis A *AB CE* '14.....MAAE Warner N Y
Irrigation Co Holliday Tex
- Rodhouse, Thomas J *BS in CE MCE* '05 MSPEE 819 Virginia
Prof Hydr Engrg Univ of Missouri Columbia Mo [Ave]
- Rodriguez, Arturo *CE* '91..MASCE 308 W Seneca St Ithaca
Cons and Contrg Engr Box 142 San Juan P R [N Y]
- Rodriguez, Francisco de P *CE* '78 51 Virtudes St Havana
Lighthouse Engineer Board of Public Works [Cuba]
- Roess, Gustav F *CE* '90.....309 W Third St Oil City Pa
General Contractor and Engineer
- Rogde, Sigurd *CE* '19 216 Park Place Brooklyn N Y
c/o Electric Bond & Share Co 71 Broadway New York City
- Rogers, Alson *CE* '72....MESPa 120 Pa Ave W Warren Pa
Borough Engineer
- Rogers, Job R *CE* '06.....MRoES Holley N Y
Engr & Contractor 63 S Main St
- Rogers, Theodore C *CE* '16..88 Chestnut St Binghamton N Y
Tel Engr Am Tel & Tel Co 195 Broadway N Y C
- Rohwer, Carl H *CE* '13.....Ft Collins Colo
Irrigation Engineer U S Dept Agr Experiment Sta
- Rollow, Thomas P Jr *CE* '09....MAAE 419 W Henderson St
Assistant Division Engineer GC&SF Ry Cleburne Tex
- Root, Francis J *CE* '73.....600 West End Ave N Y C
Pres New York Wire Cloth Co 233 Broadway
- Rose, John K Jr *CE* '15..Provident National Bank Waco Tex
407 W Oak St Carbondale Ill
- Rosenfeld, James R *CE* '15.....5857 Northumberland Ave
Factory Mgr Rauh Bros & Co Mfrs Progress Shirts Pitts-
burgh Pa
- Rosenthal, Jules E *CE* '15.....Douglas Manor N Y
Sec-Treas Gretsche Engrg Corp 103 Park Ave N Y C
- Rosenzweig, Samuel *CE* '15.....
Civil Engr Pub Service Comm 143 W 40th St N Y C
- Rosser, David M *CE* '95.....R D 1 Berwick Pa
Engr Rds and Bridges Luzerne Co Court House Wilkes-
Barre Pa
- Rossmann, Clark G *CE* '93 MD ..339 Allen St Hudson N Y
Physician and Surgeon 11 So Sixth St
- Rounds, Donald M *CE* '03..708 Sixteenth St Des Moines Ia
- Rountree, Albert C *BS in CE* '12.....Quitman Ga
County Engineer
- Routh, James W *CE* '14.....MASCE St Paul Minn
Cons Engr Bur of Mun Reseach Athletic Club Bldg
- Rue, Malcom A *CE* '99..AMASCE R F D 3 New Brunswick
American Steel Co 49 Linea Vedado Havana Cuba [N J]
- Ruhl, David A *CE* '20.....3707 Grand Ave Des Moines Ia
- Ruiz, Henry C (See Williams, E Ruiz) 2-4-6 Seventh St
- Rummele, Edward T *CE* '14.....Manitowoc Wis
Jeweler
- Runnette, Harry K *CE* '96.....2231 Dexter St Denver Colo
Civil Engineer
- Russell, Robert C *CE* '17..4158 Cleveland Ave St Louis Mo
- Rutherford, Harry W *CE* '06.....Apt 609 1021 Pine St
Civil Engr 647 New York Bldg Seattle Wash
- Rutledge, Arthur E *CE* '86..808 No Church St Rockford Ill
Contractor Mead Building
- Ryan, Walter J *AB CE* '06..MASCE Snoqualmie Falls Wash
Civil Engineer Weyerhaeuser Timber Co
- Ryman, Lynde H *CE* '13.....183 No Laurel St Hazleton Pa
Asst Engr L V R R Div Engineer's Off Sayre Pa
- Ryon, Henry *CE* '06 AMASCE 626 Flatbush Ave Brooklyn
N Y S Dept of Health Albany N Y [N Y]
- St John, Richard C *CE* '87.....Brooklyn N Y
- Sagal, Marcus *CE* '21.....1815 Linden Ave Baltimore Md
c/o Ill State Hwy Comm Springfield Ill
- Sanders, Daniel H *CE* '09 191 Forest Ave Tompkinsville N Y
Asst Engr N Y C R R New York City
- Sanderson, Albert B Jr *CE* '16..32 Westford Ave Springfield
Sales Engr Pittsburgh-Des Moines Steel Co [Mass
Pittsburgh Pa]
- Sarstedt, Gordon A *CE* '15....MCIES 2895 Weymouth Rd
Sec-Treas Genl Asphalt Pav Co & Cleve [Shaker Hts O
Wax Paper Co Cleveland O]

- Saunders, Walter L CE '17.....MACI 1323 Columbia Rd
Dist Engr Cone Steel Co Woodward Bldg Washington D C
- Savacool, William L CE '04.....74 Ray St Jamaica N Y
Civil Engineer and Surveyor Elmhurst N Y
- Sawyer, Thorp D CE '14....AMASCE c/o Mrs W P Tron-
[bridge R D 1 Tacoma Wash
- Bennett & Sawyer Casilla 706 LaPaz Bolivia S A
- Saxton, Wilbur S CE '07.....Baldwinsville N Y
Assistant Engineer New York State
- Scacciaferro, Salvator J CE '21..JASCE 506 Highland Ave
Asst Engr Alexander Potter 50 Church [Clifton N J
St N Y C
- Scarritt, Winthrop T CE '13.....733 Pleasant St Utica N Y
Secy Pratt Chuck Co Frankfort N Y
- Schaefer, John J CE '21 116 Lincoln Ave Rockville Centre
[N Y
- Schaefer, Rudolph F CE '10 730 Church St Richmond Hill
Structural Designer 120 Broadway N Y C [N Y
- Schaetzle, Theodore A CE '13.....2604 Maryland Ave
Prin San Chemist Sewerage Works Baltimore Md
- Scheckel, William B CE '17 943 St Johns Place Brooklyn N Y
Adams Evans Co 30 Church St New York City
- Scheidenhelm, Fred W AB '05 CE '06 MASCE 10944 Hilburn
Cons Engr Mead & Scheidenhelm Suite [St Hollis N Y
2025 30 Church St New York City
- Schein, Nathan CE '06.....AMASCE 1510 Carson St
Div Engr Bur of Engrg Pittsburgh Pa
- Shempf, Robert CE '20.....423 E 85th St New York City
With Jobson-Gifford Co 30 E 42d St
- Schindler, Harry CE '14.....
Schirmer, Gustav CE '11.....MASME 3832 W Monroe St
Sales Engineer 570 Penobscot Bldg [Chicago Ill
Detroit Mich
- Schmeck, Henry P CE '11.....P O Box 131 Olcott N Y
- Schmidt, Elmer E F CE '12.....MASME 3613 Lemon Ave
Genl Supt Lone Star Gas Co Dallas Tex
- Schmidt, Margaret V CE '22.....1346 Prospect Ave N Y C
- Schmidt, William H CE '94.....17 W 42d St N Y C
Retired
- Schmied, Erich E CE '15.....224 Aisquith St Baltimore Md
Mgr Fred B Young & Sons Contrs Memphis Tenn
- Schoder, Ernest W BS PhD '03..AMASCE 220 Willard Ave
Prof of Experimental Hydraulics School of Civil Engrg
Cornell Univ Ithaca N Y
- Scholtz, Herman F BCE CE '06 AMASCE 1430 Cherokee Rd
Asst Genl Mgr The McCrone Co Inc [Louisville Ky
Bangkok Siam
- Schreiber, Leonard G CE '05.....626 June St Cincinnati O
Manufacturer Box 18 Evanston Sta
- Schreiner, Alberto F CE '97....MMunlENY New York City
Efficiency Engr Comm of Accounts 2500 Municipal Bldg
- Schreiner, Frederick O CE '22.....Johnsonburg Pa
- Schroeter, Robert H CE '20.....417 E Center St Marion O
150 W 76th St New York City
- Schwalbach, Frank CE '88.....R D 8 Appleton Wis
Civil Engineer
- Schwartz, Christian CE '14.....MSAE Detroit Mich
Testing Engr Studebaker Corp Research Lab Plant 5
- Schwartz, Samuel L CE '14.....2103 62d St Brooklyn N Y
Engr & Bldg Contr 80 Maiden Lane N Y C
- Seileppi, Francis P CE '17.....Pittsburgh Pa
Appr McClintic-Marshall Constr Co Y M C A Pottstown Pa
- Seagrave, Clarence N CE '12.....Gooding Ida
Distributor Presto-O-Lite Batteries
- Seaman, Daniel H CE '08 AMASCE 17 Demarest St Newark
Str Engr D Everett Wald 1 Madison Ave N Y C [N Y
- Seaman, Van Brunt CE '20.....12 Fisk Pl Brooklyn N Y
Sales Dept U S Rubber Co 1790 Broadway N Y C
- See, Russell A BS in CE MCE '14....Montgomery City Mo
Asst Engr U S Reclamation Service Morrill Neb
- Seeley, Henry A CE '07....2307 Morris Ave New York City
Room 1107 73 Tremont St Boston Mass
- Seely, Homer R CE '19.....1519 Green St Harrisburg Pa
Res Engr Bethlehem Steel Bridge Corp Steelton Pa
- Seely, Elwyn E CE '04.....MASCE
Cons Engr 101 Park Ave New York City
- Seifried, Charles F CE '09.....2820 Reed St Cheyenne Wyo
Chf Drftsmn Wyoming State Hwy Comm
- Seipp, Clarence T CE '09....2340 Lincoln Park W Chicago Ill
Pres Mueller Construction Co Gen Contrs 179 W Wash-
ington St
- Selby, Frank S CE '13.....MACHemS 1300 North 52d Ave
Real Estate & Insurance [Omaha Neb
- Selee, Richardson CE '21.....146 Smith St Portchester N Y
1st Lieut Engrs U S A Camp Humphreys Va
- Sellstrom, Elmer W CE '07.....MSAE 611 Jefferson St
Supt Dahlstrom Metallic Door Co Jamestown N Y
- de Sena, Luis AB CE '08 MCuSE Calle 13 esq a 6 altos
Asst Engr R R Comm Havana Cuba [Vedado
- Senior, Frank S CE '96..MAAE MASCE Montgomery N Y
Vice-Pres Arthur McMullen Co 50 Church St N Y C
- Sessler, Marcel K CE '13..Gedney Farm Hotel White Plains
Pres American Spike Co Inc 71 W 35th St N Y C [N Y
- Severson, Oscar M CE '01.....AMASCE Belfast N Y
Constructing & Contracting Engineer
- Sewell, Oscar J CE '19.....Olive Hill Ky
Res Engr Ill State Hwy Comm Christopher Ill
- Sexton, Joseph M CE '15....169 W 98th St New York City
- Shae, Shao-ying D CE '10.....AMASCE Peking China
Co-Director Ry-Thru-Traffic Admin No 3 Koa Toa W City
- Shaffer, James C F CE '05.....AMASCE 5902 Euclid Ave
Vice-Pres Boldt Construction Co Cleveland O
- Shaner, George F CE '22.....110 York St Pottstown Pa
- Shanklin, George R CE '22.....Ensenada P R
- Shar, Chuan Shou MCE '22..MAREA MAWPA 4 Hsin Yeh
Engr Chinese Govt Rys Shanghai China [Lanc
- Shaw, Walter K CE '13....87 Fairview Ave Nepperhan N Y
Chief Cost Engr Turner Constr Co 244 Madison Ave N Y C
- Shelton, Murray N CE '16....617 Central Ave Dunkirk N Y
Highway Contractor
- Shen, Moo T CE '11 MCE '12.....Nanking China
Dean Nanking School Rys & Mines New Range Road
- Sherk, Earl J CE '21.....1849 Regina St Harrisburg Pa
Engr Gannett Seely & Fleming Inc Cons Engrs
- Sherman, Charles W SB MCE '95 MAWVA MASCE Bel-
Mem Firm Metcalf & Eddy 14 Beacon St [mont Mass
Boston Mass
- Sherman, Walter J CE '77 MAAE MASCE 2243 Scottwood
Cons Engr 302 Produce Exch Bldg Toledo O [Ave
- Sherwood Nial CE '08.....AMASCE Liberty N Y
Asst Supt The Foundation Co
- Sherwood, Wakeman F CE '13 27 Murray St Binghamton N Y
Draftsman Erie R R Co 50 Church St N Y C
- Shing, Shao C CE '17.....Chengtu China
Draftsman N Y C R R Co Grand Central Term N Y C
- Shipman, Linn D CE '14.....335 Halsey St Brooklyn N Y
Agency Mgr Salesman Safe Cabinet Co 90 Livingston St
- Shipman, Samuel S CE '19....229 E 26th St Brooklyn N Y
Estimator 37 So Ninth St
- Shire, Moses S CE '00.....Chicago Ill
A G Becker & Co 137 So LaSalle St
- Shirley, Lacy L CE '20.....JASCE Union W Va
Asst Engr C C C & St L R R Springfield O
- Shreve, Ralph F CE '06.....294 Tuxedo Ave Detroit Mich
Str Engr Power & Constr Dept Ford Motor Co
- Shumway, Arthur K CE '04..44 Electric Ave Rochester N Y
Alexander Shumway & Utz Co Contrs 16 State St
- Sieling, Louis J CE '07 AMASCE 211 Broad St Red Bank
Engrg Contr Second Nat Bank Bldg [N J
- Silsbee, James A CE '07 AMASCE 913 W Water St Elmira
30 W 44th St New York City [N Y
- Silverman, Aaron CE '02 1501 No Bentalon St Baltimore Md
Secy Silverman & Bonslo 1222-1230 W Baltimore St
- Silviera, Fernando X da CE '96..Monte Santo Minas Brazil
- Simpson, Robert H CE '96....1748 Summit St Columbus O
Chief Engr Dept Public Service City Hall
- Sines, Bernard S CE '22.....308 So Fiftieth St Omaha Neb
- Skinner, Frank W CE '79 MASCE 84 Hendricks Ave New
Assoc Ed of Public Works & Cons Engr [Brighton N Y
243 W 39th St New York City
- Skinner, John A CE '01.....946 Grevton Road Cleveland O
Asst Engr Val Dept N Y C R R Crown Bldg
- Skinner, John F CE '90 MASCE 21 Arnold Park Rochester
Cons Engr & Prin Asst Ctv Engr 52 City Hall [N Y
- Slack, Thomas A CE '22 1516 W Terrell Ave Fort Worth Tex
- Slater, Joseph N CE '03.....Winchester Ky
Engr Endfire Nat Gas & Fuel Co
- Sloane, George G CE '12....1733 T St N W Washington D C
- Sloat, John A CE '08.....Clyde N Y
Sloat & Sloat Autos & Farm Machinery
- Smallman, Ralph A CE '08 MCE '09....AMASCE Terrace
Vice-Pres & Treas Smallman [Court Apt Birmingham Ala
Brice Constr Co Inc 1109 Ave E
- Smith, Alger I CE '20.....Reynolds Ave Corning N Y
N Y State Hwy Dent Hornell N Y
- Smith, Arthur L CE '11.....MAAE Holland N Y
Division Engineer State Highway Dent Selma Ala
- Smith, Benjamin L CE '14.....AMASCE 616 Munsev Bldg
Asst Engr Norton Bird & Whitman [Baltimore Md
- Smith, Cameron J W CE '22..7 Hillside Ave New Hartford
[N Y
- Smith, Charles E CE '13.....Lock Box 18 Manchester N Y
- Smith, Dietz A CE '13.....313 E King St York Pa
Hydraulic Engineer S Morgan Smith Co
- Smith, Eugene L CE '12 444 Marine Trust Bldg Buffalo N Y

- Smith, Eugene R CE '77.....MASCE Islip N Y
Civil Engineer & President First National Bank
- Smith, George G CE '98 MCE '99...Algerine St Stanley N Y
Farmer
- Smith, Harry C CE '07.....150 Greenwood St Canisteo N Y
Civil Engr Seneca Falls N Y
- Smith, Henry E CE '06.....644 Maryland Ave Bellevue Pa
- Smith, John W Arch CE '12...1500 Park Ave Baltimore Md
With Norton Bird & Whitman 616 Munsey Bldg
- Smith, Joseph E CE '20.....818 Cleveland St Durham N C
With Salmon Shipp & Poe Genl Contrs
- Smith, Lawrence R CE '07 350 Tremont St No Tonawanda
Mgr Wholesale Dept Ray H Bennett Lumber Co [N Y
- Smith, Leonard J CE '92.....MECIPh 2430 Fairmont Ave
Div Engr Phila Rapid Transit Co Philadelphia Pa
- Smith, Marion deK Jr AB CE '01 AMASCE 6 Washington
[Ave Chestertown Md
- Smith, Miller A CE '71 MASCE 235 Lincoln Rd Brooklyn N Y
Consulting Engineer
- Smith, Stephen H CE '13.....Sherburne N Y
Chief Engr I W Jones & Co Milton N H
- Smith, Theodore L CE '16.....49 Meyers St Forty Fort Pa
Tel Engr AT&T Co 195 Broadway New York City
- Smith, William C CE '85....434 W 15th Ave Spokane Wash
- Smook, Joseph M CE '20.....76 Cannon St New York City
Aid U S C & G S Washington D C
- Sneckenberger, Earl M PhB CE '05....MAAE Billings Mont
City Engineer City Hall
- Snider, Clarence A CE '91....100 Montgomery Circle New
Secy & Treas The Union Sulphur Co [Rochelle N Y
- 33 Rector St N Y C
- Snively, William J CE '16.....Chicago Ill
Cost Engineer 645 No Michigan Ave
- Snow, Arch M CE '06.....44 Elm St Malone N Y
Engineer Court House
- Snyder, Charles H CE '02.....AMASCE 170 W 4th St
City Engineer City Hall Oswego N Y
- Snyder, Howard H CE '13...393 Parkside Ave Brooklyn N Y
Cons Engr Ball & Snyder 19 E 24th St N Y C
- Sobel, Julius CE '16...MAAE 135 Vernon Ave Brooklyn N Y
Sales Dept Ames Emerich & Co 111 Broadway N Y C
- Soman, Philip E CE '17....34 W 112th St New York City
- Sorokin, Marcus CE '20 JASCE MAAE 69 Bolshag Sadovay
[Kostoff-on-Don Russia
- Sourwine, James A CE '12.....
Sen Engr U S Bureau Public Roads Washington D C
- Souza, Antonio C P CE '14....Rua Helvetia 31 Sao Paulo
Railway Engineer [Brazil
- Spalding, Lawrence CE '13...MAREA MARB&BA Box 243
Asst Val Engr Bessemer & Lake Erie R R Greenville Pa
- Spamer, Morris A CE '13 929½ Oak Hill Ave Hagerstown
Manager Joseph Brenner & Co Barksdale Wis [Md
- Spandau, Harry M CE '09 MCE '10...35 Eighth St Ridgefield
Ind Engr Lybrand Ross Bros & Montgomery [Pk N Y
- 110 William St N Y C
- Sparfield, Emil H CE '12.....175 St James Pl Buffalo N Y
Asst Production Mgr American Chain Co Bridgeport Conn
- Spear, George P Jr CE '16...186 Bloomfield Ave Passaic N J
Asst Engr N Y Tel Co 104 Broad St N Y C
- Specht, Harry G CE '13....335 E 68th St New York City
Ind Engr Bassick Co Bridgeport Conn
- Spelman, Harold J CE '10 MAAE AMASCE Huntington W
Div Engr State Road Comm 107 Robson Pritchard Bldg [Va
- Spelman, William A CE '08.....Champlain N Y
- Spence, Thomas R CE '17....c/o State Hwy Dept Austin Tex
Div Engr State Hwy Dept Cham of Comm San Antonio
Tex.
- Spencer, Clifton B CE '94.....528 Moffet Ave Joplin Mo
Val Engr St Louis-San Francisco Ry St Louis Mo
- Speyer, Elwin G CE '07.....MASCE 1509 Seneca St
Cons Engr 801 Chamber of Commerce Buffalo N Y
- Spiker, William C CE '00 MASCE MAAAS 33 E Fourth St
Cons Engr Spiker & Lose 520 Forsyth Bldg Atlanta Ga
- Spivak, William CE '20...JASCE 194 Thatford Ave Brooklyn
[N Y
- Spivey, Willis T BS in CE CE '10.....Greenville Ga
Mat Handling Engr W T Spivey & Co 112 So 16th St
Philadelphia Pa
- Spragins, William E CE '08...Univ Club Salt Lake City Utah
Wholesale Stove & Range Bus 702 Walker Bank Bldg
- Sprague, Danley D CE '95.....MAAE Holley N Y
Sen Str Engr Val Dept I C C 1901 D St Wash D C
- Sprague, Frank D CE '11 c/o F J Sprague 421 Canal St NYC
- Sprigg, C Crawford CE '07...AMASCE 15 Central Ave St
Pres Gen Contrg & Engrg Co [George Staten Isd N Y
- 40 Rector St New York City
- Squire, Walter L CE '10...Lewiston Road Niagara Falls N Y
Niagara Falls Power Co
- Stahl, John J CE '12.....315 Manning Blvd Albany N Y
- Hwy Engr Bur Pub Roads 301 Custom House Bldg Denver
Col
- Stallfort, J Alfred CE '10 AMASCE MECIMd 3217 Carlisle
Gen Mgr Bldg Dept Consol Engrg Co 243-59 [Ave
Calvert Bldg Baltimore Md
- Stalker, John H CE '20.....9 James St Montclair N J
- Standiford, Harry R CE '10...1229 L St N W Washington DC
Constr Supvr J G White Engrg Corp 43 Exchange Pl NYC
- Stanton, Grove A CE '07...MPNWSE R F D 9 Auburn N Y
- Stanton, Robert B Jr CE '09 AMASME 7 Christopher St
Sales Engr U S C I Pipe & Foundry Co [N Y C
- Stapley, Edward R CE '14.....32 Oak St Geneseo N Y
Secretary Geneseo Auto Co
- Starkweather, Alfred K CE '12...8 Farrington St Caldwell
Engineer N Y Tel Co 15 Dey St N Y C [N J
- Starr, Charles F CE '15 MRoES 314 Sherwood Ave Roch-
Chief Engr Genesee Bridge Co Inc 666 [ester N Y
- Plymouth Ave
- Stearns, Fred L CE '10.....AMASCE Norwich Conn
Asst Engr Am Bridge Co 30 Church St N Y C
- Stearns, John CE '06 AMASCE 446 Ocean Ave Brooklyn N Y
Constr Supvr J G White Engrg Corp 43 Exchange Pl
N Y C
- Stebbins, Smith H CE '95...590 E 19th St Brooklyn N Y
Assistant Chief Map Division Hall of Records
- Steel, Ernest W CE '20.....Maple Shade N J
Sp Mem Staff Internal Health Board U S Engrg Off
Savannah Ga
- Steele, Gilbert V CE '10.....245 State St Flushing N Y
With Solomon-Abbott Co 175 Fifth Ave N Y C
- Stegner, Clifford M BS CE '00...MASCE 3455 Cornell Pl
Stegner & Hughes Archs & Engrs 1700 Union Trust Bldg
Cincinnati O
- Stein, Myer CE '17.....508 Elton St Brooklyn N Y
- Steinacher, Gustavo J CE '92.....9 W 91st St N Y C
Chief Engr Dept of Parks Mun Bldg
- Steljes, Martin CE '15....1419 Clinton Ave New York City
Dist Engr Concrete Steel Co 42 Broadway
- Sterling, Guy CE '87.....MASCE 1543 E Ninth So St
Cons Engr 630 Clift Bldg Salt Lake City Utah
- Stern, Jeno CE '21.....222 E 96th St New York City
Draftsman Amer Br Co Elmira N Y
- Sternbach, Jacob J CE '21.....968 Tiffany St New York City
- Stevens, Harold B CE '02.....Masontown Fayette Co Pa
Field Engr Carnegie Steel Co Clairton Pa
- Stevens, John H CE '08.....AMASCE Rome N Y
Asst Engr N Y State Hwy Comm Watertown N Y
- Stevenson, Albert L CE '13.....AMASCE
Desng Engr E E Seelye Cons Engr 101 Park Ave N Y C
- Stewart, Charles G BS CE '12.....MAAE Box 612 Flora Ill
Asst Div Engr Ill Div B & O R R
- Stewart, Clinton B CE '90.....AMASCE MWeSE
Cons Hydr Engr 2321 Rowley Ave Madison Wis
- Stewart, David B Jr CE '09 2601 No Charles St Baltimore Md
Asst Supt Raymond Conc Pile Co Sparrows Pt Md
- Stewart, Walter P CE '07.....312 E 34th St Portland Ore
Asst Adm Off Alexander Hamilton Inst 13 Astor Pl NYC
- Stibolt, Victor A CE '11....532 W Seventh St Davenport Ia
Natalbany Lumber Co Ltd Hammond La
- Stidham, Harrison CE '91 AMASCE MWaSE 3322 Newark
Wilkins Bldg Washington D C [St
- Stine, Charles R CE '96.....
- Stirling, Vincent R CE '05...851 So Wilton Pl Los Angeles
[Calif
- Stockdale, Thomas R CE '07.....Summit Miss
Civ Engr with Gardner & Howe 76 Porter Bldg Memphis
Tenn
- Stolz, Albert F CE '19...500 Wilmac Bldg Minneapolis Minn
Secy Merchants Life & Casualty Co
- Stone, Don O CE '09.....1095 Elmwood Ave Columbus O
Secy & Treas The Crowell & Stone Co Bituminous Contrs
452 So Pearl St
- Stone, Edward C CE '02....Route 2 Box 30 Gardena Calif
Brokers Agent
- Stone, George C CE '11.....AMASCE Altavista Va
Genl Mgr Altavista Light & Power Corp
- Stone, James S CE '89.....516 Grimes St Sewickly Pa
Checker American Bridge Co Ambridge Pa
- Stone, Morris CE '15.....38 Lincoln Ave Amsterdam N Y
Stone's Toggery Shops
- Storey, Frank S CE '02.....AMASCE
c/o The Phoenix Constr Co 41 Park Row New York City
- Storey, William R CE '81...MRoES 30 Hortense St Rochester
Civil Engr and Surv 510 Ellwanger & Barry Bldg [N Y
- Storz, Joseph F CE '06....35 Wyoming St Wilkes-Barre Pa
Maintenance of Way Dept Lehigh Valley Railroad
- Stott, Charles A CE '19.....3164 17th St Washington D C
Clerk Chas G Stott & Co Inc Paper & Stationery
- Strahan, Joseph C J CE '13....210 W 90th St New York City

- Strang, Percival CE '97.....Gen Supt The Dunn McCarthy Co 520 Old Colony Bldg Chicago Ill
- Strasburger, Edgar J CE '00..MAAE 303 So Idaho St Butte Strasburger Civil and Mining Engrg Co 614 Daly [Mont Bank Bldg
- Stratton, William H CE '88 194 Prospect St Ridgewood N J Mgr Br and Bldg Dept U S Steel Prod Co 30 Church St N Y C
- Strong, Herbert W CE '94.....1939 E 90th St Cleveland O Sec The Strong Carlisle & Hammond Co 1392 W Third St
- Strumer, Samuel CE '17....1384 Bristow St New York City Fouquor Concrete Co 29 Broadway
- Stuart, Thomas M CE '15..149 Sumner Ave Springfield Mass Indl Engr Tolhurst Machine Works 648 Fulton St Troy NY
- Stubbs, James H CE '76.....Fort Morgan Colo Civil Engineer
- Sturdevant, James H CE '05..AMASCE Poughkeepsie N Y Div Engr N Y State Highway Commission
- Sullivan, John G CE '88 MASCE, MEIC MAREA 207 Harcons Engr 703 McIntyre Blk Winnipeg [Ivvard Ave Manitoba Can
- Sullivan, Michael G CE '21..354 Garson Ave Rochester N Y 134 Mariner St Buffalo N Y
- Sullivan, Philip L CE '18.....1 Loring Hall Springfield Mass Maintenance of Way Dep. L V R R Buffalo N Y
- Summers, Richard E J CE '14 AMASCE 508 McNair Ave Asst Ch Engr H K Ferguson Co Cleve- [Wilkinsburg Pa land O
- Summers, William F CE '14....144 Queen St Ithaca N Y With Edward Sprigg Contractor & Builder
- Sun, Taoyuh C CE '09..AMASCE 15 Pekin Rd Shanghai Managing Director Chuchow-Chinchow Ry Tur-farr [China Hutung Pekin China
- Sun, Yu-fong CE '18.....JASCE 2 Taku St Tientsin China Sect Engr Peking-Suiyuan Ry Peking China
- Sundstrom, Charles A Jr CE '21 176 Wisner Ave Middletown Jun Asst Engr N Y State Hwy Dept [N Y
- Super, Stanley L CE '12.....7 So Sixth St Pottsville Pa Civil Engineer East Penna Rys
- Supplee, George W CE '15.....Haddon Heights N J Supt Ore Docks P & R Ry 2821 Richmond St Philadelphia Pa
- Sutton, Paul B CE '12.....818 Academy St Watertown N Y City Engineer
- Swanitz, Henry W CE '00.....AMASCE 1210 Eighth Ave Bldg Insptr City Hall San Francisco Calif
- Swerdlow, Louis CE '17.....MAAE 1384 Prospect Ave Jun Engr Room 606 39 Whitehall St New York City
- Swick, Charles H CE '10.....Livonia N Y 99 Cannon St Poughkeepsie N Y
- Swick, Clarence H CE '07..MPhSWa Capitol Heights Md Geodetic Computer U S C & G S Washington D C
- Swindells, Joseph S CE '95 MCE '98 MASCE 1090 E 18th St Cons Engr with J A Bensel 16 E 41st St [Brooklyn N Y N Y C
- Swinney, Robert E CE '08.....Kinston N C Constr Engr 2d Dist N C State Hwy Comm
- Symonds, George R B CE '09 AMASCE MSAmE 39 Wayne Town Engineer Nutley N J [PI
- Tan, Vidal A AB MA '18 CE '18 469 Salspuedes Manila P I Civil Engr and Instr University of the Philippines
- Tang, Cheng Long CE '21..Tang's Villa Kishup Hup Hupeh [China
- Tate, Robert L H CE '12 MAAE AMASCE 219 Linden Ave [Ithaca N Y
- Taussig, J Wright CE '08....AMASCE 468 Riverside Drive Asst Gen Mgr Raymond Concrete Pile Co 140 Cedar St N Y C
- Tavares, Juan T CE '18.....Santiago Dominican Rep Engineer Tavares Socs Builders
- Taylor, Albert M CE '15.....Athens Ave Ardmore Pa
- Taylor, Clinton L CE '12.....Wyalusing Pa Agriculture
- Taylor, Edward H BS CE '12 Care C & P Tel Co Roanoke Va Engr Lockwood Greene & Co 1566 Hanna Bldg Cleveland O
- Taylor, Robert C CE '99.....620 Mellon St Pittsburgh Pa Supt Lucy Furnaces Carnegie Steel Co
- Taylor, Roy CE '10.....455 Greene Ave Brooklyn N Y Munson Steamship Co 82 Beaver St New York City
- Taylor, Royden J BE CE '03....644 Wayne Ave Indiana Pa Civil Engineer
- Taylor, S Leroy CE '13 3529 Columbus Ave Minneapolis Minn Sen Hwy Engr U S Bur Pub Rds 410 Hamm Bldg St Paul Minn
- Taylor, Thomas U CE MCE '95..MASCE San Antonio Tex Dean of Engineering Univ of Texas Austin Tex
- Taylor, T Walter CE '00 1424 W 35th St Oklahoma City Okla Assistant General Manager Fortuna Oil Co 424 Lee Bldg
- Taylor, William R CE '03.....1257 Dean St Brooklyn N Y Thos F Taylor's Sons Inc Coal 588 Kent Ave
- Tchan, Joseph J CE '09.....4 Sheridan St Auburn N Y Assistant Engineer L V R R Co
- Tempest, Richard C CE '09 163 Albermarle Ave Rochester NY
- Ten Hagen, Henry CE '13.....AMASCE High Falls N Y Co Engr N Y State Hwy Comm Warsaw Wyoming Co N Y
- Tenney, Maynard A CE '98....1049 E 18th St Brooklyn N Y Inspector Subway Construction Philadelphia Pa
- Terrazas, Federico CE '16.....Macon Mo
- Terrell, Adelphus C CE '00.....Div Engr on Val N P Ry Seattle Wash
- Tevonian, Hagop P CE '21.....Kasta Armenia
- Thacher, Cornelius S CE '78..MAAAS Clifton Springs N Y Professor Mathematics Retired
- Thatcher, Romeyn Y CE '09..1077 Elmwood Ave Buffalo N Y Civil Engineer Lackawanna Steel Co
- Thebaud, John E CE '95.....234 Parker Ave Buffalo N Y Engrg and Patents 607 Otis Bldg Philadelphia Pa
- Thiele, Claude M CE '11..1472 Kilbourne Pl Washington D C Captain U S A Coast Artillery Corps
- Thomas, Edward J CE '15 AMASCE Avon Apts 6 E Read St Engr Develpt & Constr Co American Bldg Baltimore Md
- Thomas, Edwin R CE '09.....Box 202 Warren R I Mgr Branch Office L E Locke & Son Contrs New Bedford Mass
- Thomas, Howard CE '77.....Stuart Fla Retired
- Thomas, James B CE '04.....122 Columbus St Elyria O Assistant Vice-President The Garford Mfg Co
- Thomas, Joseph A CE '20....JASCE c/o Mrs B A Hosfeld Asst Engr Manila Electric Co [Clarks Summit Pa Manila P I
- Thomas, Seymour P CE '72 c/o Phoenix Iron Co 49 William Retired [St New York City
- Thomas, William C CE '01..210 Plummer Ave Emsworth Pa Checker
- Thomassen, Victor G CE '11....AMASCE 539 Madison St Amer Br Co 30 Church St New York City [Brooklyn N Y
- Thompson, Alexander M CE '13.....405 Plymouth Bldg [Minneapolis Minn
- Thompson, Chester A CE '16..158 Dana Ave Albany N Y c/o Scovell Wellington & Co Hanna Bldg Cleveland O
- Thompson, Elmer E CE '11....AMASCE 715 W Church St American La France Fire Engine Co [Ehmlra N Y
- Thompson, Ewing CE '14.....305 Third Ave Lewiston Ida
- Thompson, George R CE '17....41 Woolsey St Astoria N Y
- Thompson, Hoxie H BS CE '05.....Trinity Tex President Thompson Bros Lumber Co
- Thompson, Karl F CE '14.....Seneca Falls N Y Asst Engr N Y State Hwy Comm Hornell N Y
- Thompson, Robert W CE '22.....Corona N Y
- Thompson, Wells N CE '21.....8 East St Adams Mass
- Thoms, Joseph C Jr CE '22..1280 Herkimer St Brooklyn NY
- Thomson, Alexander Jr CE '99....MASCE 104 No 22d St Dist Sales Mgr Conc Steel Co 42 [Orange N J Broadway N Y C
- Throop, Henry G CE '05....AMASCE 2117 So Geddes St Supt for Contractor F J Baker Syracuse N Y
- Throop, William B CE '77 464 No Prairie St Galesburg Ill Gen Supt Q O & KC and I & St L RRs
- Thweatt, Hardin H CE '13....1820 E 87th St Cleveland O Ind Engr Van Dorn & Dutton Co
- Tier, Lewis P CE '74....10515 Bryant Ave N E Cleveland O Car Dent N Y C R R Co Collinwood O
- Toffany, Nathan N CE '05 AMASCE East Hampton N Y Civil Engr & Sur Mem Bd of Supervisors Suffolk Co
- Tiffany, Nelson O Jr CE '01..214 W Ferry St Buffalo N Y Pres & Gen Mgr Masonic Life Assoc Masonic Temple
- Tillotson, Edwin H CE '17....130 E Elm St Rochester N Y Bldg & Contrg 207 Amer Bank Bldg Pontiac Mich
- Tilton, Benjamin CE '97..MASCE MAREA 18 Mason Place Vice-Pres N Y State Rys 303 Gridley Bldg [Utica N Y Syracuse N Y
- Ting, Zung-Kun MCE '20 MSSCh Kun-Shan Kiang-Su China
- Todd, Clarence L CE '07 AMASCE Box 1377 Honolulu T 11 Contr Engr Pittsburgh-Des Moines Steel Co
- Tolles, Frank C CE '05..MASCE 265 So Columbus Ave Mt Supt Bureau Public Works Akron O [Vernon N Y
- Tomlinson, Frank C CE '74.....721 Park Ave Ironton O c/o A G Simpson 800 Citizen's Nat Bank Bldg Los Angeles Calif
- Tompkins, George S CE '96 AMNFPA 40 Kilby St Boston Supt Eastern Off Firemen's Fund Ins Co [Mass
- Tompkins, Howard C CE '03..819 Roland Ave Baltimore Md Member of Firm R K Meade Co 13 E Fayette St
- Toms, Raymond E CE '07.....2038 W 108th Pl Chicago Ill U S Sen Highway Engr P O Bldg So Chicago Ill

- Torrance, Chester C CE '99 MCE '00 MCuSE Industria 100
Torrance & Portal Engineering Contractors [Havana Cuba
Torrance, Robert S CE '16 165 Buckingham Rd Yonkers N Y
The Southern Cotton Oil Co 1515 Broad St Augusta Ga
Towl, Forrest M CE '86 MASCE MASME MAIME Shelter
Pres Southern Group Pipe Lines [Island Hts N Y
18 Broadway N Y C
Towle, John W CE '94.....MomTecCl 3602 Pacific St
Pres Omaha Steel Works 348 Bee Bldg Omaha Neb
Townsend, David W CE '15.....P O Box 677 Ida Grove Ia
Engr Iowa Highway Comm
Trask, Clarence H CE '12....AMASCE R D 2 Fulton N Y
Constr Supt Dupont Engrg Co Wilmington Del
Trau, Frank G CE '22.....1714 Franklin St Waco Tex
Trautwine, John C 3d CE '00 MASCE, Box 6509 Upper Darby
Civil Engr Philadelphia Pa [Branch
Trimpi, Allen L CE '10 AMASCE, 279 Main St Chatham N J
C E Dept Federal Shipbldg Co Kearney N J
Tripp, Harry H CE '08.....Dryden N Y
Res Engr C P R R Edmonton Alberta Canada
Troxell, Willard W CE '14...3312 W North Ave Baltimore Md
Truesdell, Walter E CE '97....29 Mountain Ave Summit N J
Industrial Engineer 5 Beekman St New York City
Trumbull, William C CE '82.....11½ Gruff St Oil City Pa
Asst City Engineer
Truran, Ernest A CE '95...33 Lincoln Terrace Yonkers N Y
Asst Engr
Tsai, Ping Y CE '11 AMASCE Chang Chow Kiang Su China
Assistant Engineer Chuchow-Chinchow RR Peking China
Tuller, Jesse D CE '09.....88 Branch Ave Red Bank N J
Supt of Constr L J Sieling Contr
Tunncliffe, John C CE '17.....R F D 369 Moline Ill
Constr Supt Priester Constr Co 1006 Kahle Bldg Davenport
Ia
Turneure, Frederick E CE '89 MASCE MWeSE Madison
Cons Engr Dean Coll of Mechs & Engrg Univ of Wis [Wis
Turner, Ebenezer T CE '83.....Box 434 Ithaca N Y
Vice-Pres First National Bank & Morse Chain Co
Turner, Horace G CE '92.....Pope's Mills N Y
Rossie N Y
Turner, Myron W CE '11.....MAAE Atlantic Ia
Mech Supt Gun Cotton Plant Noble Ont Can
Turner, William J CE '07.....MAIME Lexington Va
Asst Gen Mgr Braden Copper Co Rancagua Chile S A
Turrill, Sherman M BA CE '01...703 South Ave Maywood Ill
Tuttle, Sidney L CE '01.....R D 1 Corning N Y
Elston Pl Ithaca N Y
Tuttle, Walter I CE '02.....32 Medway St Providence R I
Treas & Gen Mgr Frank Mossberg Co Attleboro Mass
Twining, William CE '90...411 Center St E Mauch Chunk Pa
Engineer Maintenance of Way C R R Co of N J
Ulrich, Carl O CE '08 MAISCE 475 Hamilton St Albany N Y
Asst Deputy Commr State Tax Comm Capitol Bldg
Underhill, Arthur CE '99....MASLArch Wallingford Conn
Landscape Architect
Underhill, George G CE '06....AMASCE 23 Western Ave
Mgr Fraser Brace & Co 83 Craig St W [Albany N Y
Montreal P Q Can
Underwood, Bert O CE '22.....Summit N J
Underwood, Howard W CE '01.....AMASCE Moglan Pa
Genl Mgr Field Barker and Underwood Philadelphia Pa
Underwood, Paul H CE '07.....906 E State St Ithaca N Y
Professor Surveying School of Civil Engrg Cornell Univ
Unger, George F CE '10 AMASCE 31 Berkeley Place Buffalo
Asst Engr City Planning Comm 328 Prudential Bldg
Upjohn, Richard R CE '80 BD...1676 69th St Brooklyn N Y
Priest
Urner, Jonas P CE '05.....Frederick Md
Scott & Hume Contrs Zarale Buenos Aires Arg Rep S A
Urquhart, Leonard C CE '09 AMASCE Oak Hill Road Ithaca
Asst Prof of Bridge Engrg Cornell Univ [N Y
Utz, Charles P CE '04.....90 Richland St Rochester N Y
Vice-Pres Alexander Shumway & Utz Co 16 State St
Valderrama, Manuel A CE '18 131 Bay 10th St Brooklyn N Y
c/o Tavares Soes Santiago Dominican Rep
Van Camp, Paul M CE '20.....Fine View N Y
c/o Methodist Missions Peking China
Van Campen, James K CE '17 308 No Clinton St Olean N Y
Van De Mark, Otis S CE '10...4608 Caroline St Houston Tex
Vice-Pres Amer Constr Co 410 Gulf Bldg
Vanderbeck, Horace A CE '11 MCE '12...MSPEE MESCh
Wusih Tech Sch Wusih Kiangsu China [Somerville N J
Vandevanter, Elliott CE '08.....AMASCE Leesburg Va
Capt Corp of Engrs U S A San Antonio Tex
Vanneman, Arthur V CE '09...1257 Lincoln Ave Tyrone Pa
Pres Tyrone Lime & Stone Co
Vanneman, Charles R CE '03...AMAREA 555 Providence St
Chief Engr N Y State Pub Ser Comm [Albany N Y
VanSicklen, Abram L CE '12 298 St Anns Ave Richmond Ill
- Draftsman N Y State Pub Serv Comm 7th Div [N Y
N Y C
Van Valkenburg, Paul I CE '20 9137 115th St Richmond Hill
c/o N Y Tel Co 15 Dey St New York City [N Y
VanVliet, Paul D CE '10.....160 Forest Ave Oak Park Ill
Pub Mgr Universal Port Cem Co 208 So LaSalle St Chicago
Vedder, Herman K CE '87.....E Lansing Mich
Professor Civil Engineering Mich Agr Coll
Vedder, Wellington R CE '91.....Catskill N Y
Vickers, Thomas McE CE '90 MCE '91 313 Maple St Syracuse
Sec & Treas Syracuse Dry Goods Co 200 So Clinton St [NY
Viertels, Ephraim BS CE '05.....776 Prospect Ave N Y C
Engineering 1 Beekman St
Vieweg, Fred Jr CE '11.....Trona Calif
Asst Genl Mgr American Trona Corp
Vieweg, Otto C CE '16.....453 Cypress St Elmira N Y
Statistician Elmira Water Light & R R Co
Vincent, Everett M CE '15.....40 Park Place Goshen N Y
Reinf Conc Desnr Chile Exploration Co 120 Bdwy N Y C
Vivoni, Armando CE '15.....San German P R
Asst Engr Isabela Irrig Serv Quebradillas P R
Vizzaino, José M CE '15.....Vives 247 Cardenas Cuba
Contracting Engineer
Vogelson, John A CE '00.....MASCE 8009 Crefeldt St
Chief Bureau of Surveys City Hall [Philadelphia Pa
Volz, Charles A CE '11.....Albany N Y
Chief Div of Light, Heat & Power Pub Serv Comm
Vong, Pao Ling MCE '22...567 Burkhill Road Shanghai China
Vonsburgh, Claude G CE '09.....33 Albion St Malden Mass
Vose, Walter I CE '92.....Manville R I
Merchant
Wadsworth, Joel E CE '90....MASCE MAREA MASTM
Div Engr Am Bridge Co 30 Church St N Y C [MAISI
Waesche, George E AB CE '95 14 Summit St Glen Ridge NJ
Cons Engr with Sanderson & Porter 52 William St N Y C
Wagner, George O CE '00....210 W 90th St New York City
Vice-Pres Terry & Tench Co Inc Grand Central Term
Wait, Bertrand H CE '02 MASCE 62 Montgomery St Pough-
Dist Engr Port Cem Assoc 374 Madison [keepsie N Y
Ave N Y C
Wait, John C CE '82 MCE '91 LLB MASCE 1520 Jessup Ave
Attorney at Law Woolworth Bldg [Highbridge N Y C
Wait, Owen A CE '98.....AMASCE 1629 West 47th St
Edison Building Los Angeles Calif
Wait, Robert S CE '13.....12 Mitchell St Norwich N Y
Engineer and Contractor 66 So Broad St
Walbran, Nicholas A CE '18.....Oriskany N Y
Draftsman The Bossert Corp 1408 Oneida St Utica N Y
Waldo, Reginald CE '19.....Campbell Hall N Y
U. S. Geol Surv Eighth & Olive Sts Rolla Mo
Wales, William H Jr CE '12.....R F D 4 Oswego N Y
Walker, Carl H CE '18.....Cathedral Apts Baltimore Md
President Walker Equipment & Supply Co
Walker, Charles L CE '04...AMASCE 201 Fairmount Ave
Prof San Engrg School of Civil Engrg Cornell [Ithaca N Y
Univ
Wall, James J Jr CE '16....543 W End Ave New York City
Repr Holt Mfg Co 262 Pearl St Buffalo N Y
Wallace, Aaron V D CE '20.....JASCE Goshen N Y
Val Dept Union Gas & Elec Co 1105 Elm St Cincinnati O
Wallhauser, George O CE '96....602½ E State St Olean N Y
Walzer, Isidore CE '09.....AMASCE 214 Elizabeth Ave
Co Asst Engr N Y State Hwy Comm Hempstead N Y
Walzer, Samuel J CE '12 881A Lafayette Ave Brooklyn N Y
President Walzer Bros Corp 44 Court St
Wang, Chieh-Yao MCE '19.....MChES 3 Tah-Sen Bridge
[Ningpo China
Wang, Chien Hsien MCE '20 Hopei Kwanshan St Tientsin
Asst Engr Works Dept Chili River Comm [China
Wang, Hsi C MCE '21 Ministry of Communications Peking
[China
Wang, Li Z CE '22.....Checheng Hunan China
Wang, Tsan CE MCE '12.....Tientsin China
Wang, Tsen Shih MCE '22.....Siuza Road Shanghai China
Wang, Yuen Ling MCE '22...c/o P L Vong 567 Burkhill Road
[Shanghai China
Wang, Yu Kwang MCE '22....c/o Nauyang Middle School
[Shankhai China
Wannamaker, William W CE '21 20 Elliott St Orangeburg
c/o S C Highway Bridge Dept 966 Heard Ave [S C
Augusta Ga
Wanzer, Charles T CE '13 c/o Prof S G George Ithaca N Y
c/o Great Falls Power Co Great Falls S C
Ward, Albert A CE '13.....32 South St Stamford Conn
Driscoll Bros & Co Ithaca N Y
Warner, Howard S BS CE '11 921 Crawford St Vicksburg
[Miss
Warner, Loring K CE '10.....336 E Church St Marion O
President Marion Sand & Gravel Co

- Warner, Monroe CE '88....MCIES MOTA 1386 E 81st St
Mgr Warner Mfg Co 810 Citizens Bldg Cleveland Ohio
- Warriner, Thomas R CE '93....MlaES 1011 Third Ave E
Cons Civil Engr 324 Downs Bldg [Cedar Rapids Ia
- Warthorst, Frank W CE '74....MAAAS R D No 2 Box 32
Retired Manufacturer [Bakersfield Calif
- Washburn, Frank S CE '83 MASCE Grace Church St Rye
Pres Amer Cyanamid Co 511 Fifth Ave N Y C [N Y
- Wasson, Charles W CE '74.....Friendship N Y
Manufacturer Cuba N Y
- Watkins, Charles B CE '15....1105 N Gilmor St Baltimore Md
Lt (jg) CEC U S N Naval Operating Base Norfolk Va
- Watson, Carl H CE '10.....AMASCE Great Neck N Y
Pres Gregory Coal & Lumber Co
- Watson, M Ross CE '12.....Danville Va
Secy-Treas Watson-Fitzgerald Co Inc Bldrs Sup
- Weatherlow, Hugh E CE '07....326 So Union St Olean N Y
Off Mgr of Constr Raymond Conc Pile Co 140 Cedar St
N Y C
- Weatherston, John CE '95 MD....MAMA 734 Oakwood Blvd
Physician 30 N Mich Ave [Chicago Ill
- Weaver, David W CE '13.....17 King St Jamaica N Y
Rodman Classified Service Penn R R Co Philadelphia Pa
- Webb, James R CE '11.....20 Wright Pl Scarsdale N Y
Estmg Engr Turner Constr Co 244 Madison Ave N Y C
- Webb, Seth W CE '06....MAAE 4146 E 106th St Cleveland O
Asst Engr Cleveland Union Terminals Co
- Webb, Walter L CE '84 MCE '89 MASCE MECIPh MAREA
Cons Engr 1211 Walnut St Philadelphia Pa
- Weber, Bernis B CE '04 MAAE 111 Cowell Ave Oil City Pa
City Engineer City Hall
- Weber, Charles M BS in CE CE '14 MCE '15.....JASCE
[406 E Market St Stockton Calif
- Weber, Richard CE '18.....Camillus N Y
Asst Engr Schenectady Rys Co Schenectady N Y
- Webster, Adrian K CE '14....5548 Blackstone Ave Chicago Ill
Ranch & Oil Business Box 3 Vega Texas
- Weed, Addison CE '79.....MNYSHorS North Rose N Y
Fruit Grower and Farmer
- Weidberg, Naphtah CE '19 MAAE 1483 Bryant Ave N Y C
- Weidman, J Hynds CE '03.....AMASCE Marcellus N Y
Civil Engr and Contr 226 Union Bldg Syracuse N Y
- Weidner, Carl R CE '04....AMASCE 306 W Main St Indepen-
Chief Engineer The Prairie Pipe Line Co [dence Kan
- Weindling, Ludwig CE '18.....719 Macon St Brooklyn N Y
- Weiss, Bertrand CE '09....300 Riverside Dr New York City
Sec & Treas Bershire Products Inc 18 W 34th St
- Weiss, Charles CE '13.....247 Gregory Ave Passaic N J
Supervisor Pa R R Monongahela City Pa
- Weiss, Samuel CE '13.....1158 Carter Ave Detroit Mich
Salesman Semet-Solvay Co 1705 Real Est Exch Bldg
- Welker, Philip A CE '78 MASCE 1801 16th St N W Wash-
Retired [ington D C
- Welles, Theodore L Jr CE '13 AMASCE 2316 Grandview Ave
Constr Supt Crowell & Little Constr Co Cleveland O
- Wells, Edward H Jr CE '10....743 Myrtle Ave Albany N Y
58 Sterling Place Brooklyn N Y
- Wells, Jesse W CE '10.....Setauket N Y
Surveyor
- Wells, Lawrence R CE '21.....Schuylerville N Y
Sales Mgr Orange Cotton Mills Orangeburg S C
- Welsh, Russell D CE '13....AMASCE Box 524 Patton Pa
Draftsman & Desnr Penn Coal & Coke Corp
- Werner, Victor H AB '12 CE '14 182 Sunnyside Ave Brooklyn
Sales Engr Belmont Iron Works 15 Park Row N Y C [N Y
- West, Randolph C CE '20....922 Gravier St New Orleans La
With Jas Stewart Co Inc Humble Oil Bldg Houston Texas
- West, Ray B CE '06....MORSE MASAgRE 93 Boulevard Logan
Director Agr Engrg. & Mech Arts Utah Agr Coll [Utah
- Whedbee, Edgar CE '10.....309 North St Portsmouth Va
Cons and City Engineer Bonham Tex
- Wheeler, Paul T CE '14.....Lackawanna N Y
Draftsman Amer Bridge Co Ambridge Pa
- Wheelock, Charles B CE '76....209 Babcock St Brookline Mass
Pres C B Wheelock Ins Agency Inc
- Whelpley, James R CE '96.....Riverdale Md
- Whipple, John B CE '07 AMASCE 209 Willow Ave Ithaca NY
Res Engr United Illtg Co 1115 Broad St Bridgeport Conn
- Whiskeman, James P CE '98....AMASCE 3343 Sedwick Ave
Cons Engr 153 E 40th St New York City
- Whitbeck, Arthur S CE '03.....MAAE 160 Rockingham St
Asst Engr Dept State Engr 43 Triangle Bldg Rochester
NY
- White, Frank M CE '11.....AMASCE Brockport N Y
Dist Engr Cor Bar Co 1515 Gt Northern Bldg Chicago Ill
- White, John S CE '02.....103 Waban Ave Boston Mass
With Morse Chain Co of Ithaca N Y 141 Milk St
- White, Ralph L CE '11....1130 Academy St Watertown N Y
Lumber Business & Contracting G W White & Son
- White, T Sidney CE '73 MASCE MESWPa 837 N Seventh
[Ave Tucson Ariz
- White, Willard O CE '00 MASCE 150 Stockton Ave U...
Chief Engr W J Rainey Inc Fayette Title [town Pa
- White, William A CE '12.....1519 Park Ave Baltimore Md
- Whitman, Ezra B CE '01 MASCE 139 W Lanvale St Balti-
Mem Firm Norton Bird & Whitman [more Md
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POLICY

(Continued from page 123)

change in the magazine will be made in the present Alumni Notes Department. These notes will be set up in smaller type so that we can offer more of them to our readers in every issue. The recently revised status of the School and University Notes Departments will continue next year. The coming year will also see a strengthening of our magazine financially. In an attempt to bind the alumni more closely to the School and also in order to increase our circulation, a whirlwind subscription campaign will be started next fall. Here is an opportunity to

help your magazine along. First, subscribe yourself and then let us know of any alumni who you think would be willing to subscribe. The foregoing is just a bare outline of the improvements which we think necessary for a better magazine. If you have any suggestions or criticisms we would like to hear them. Above all we intend to work together and co-operate in making the **Cornell Civil Engineer** more symbolic of the position which Cornell engineers themselves hold in the eyes of the world—among the best in the country.

FUERTES GOLD MEDALISTS

UNDERGRADUATES

Albert Lloyd Colsten	1895
William Mackintosh	1896
Gilbert Powers Ritter	1897
Harley Stuart Gibbs	1898
George Wilfred Penfield	1900
George Emil John Pistor	1901
Albert Hotchkiss Chandler	1902
Justin Wyman Ludlow	1903
Ross Milton Riegel	1904
John Earl Elliott	1905
Charles Ferguson Cook	1906
Ford Kurtz	1907
Bruno Charles Lechler	1908
George Frederick Weighardt	1909
Lionel Montefiore Levine	1910
John Raymond Hoffert	1911
Edwin Samuel Healy	1912
Roger Williams Parkhurst	1913
Louis Isaac Zagoren	1914
Herbert Ridgeway	1915
Theodore Chittenden Rogers	1916
Samuel John Leonard	1917
Morris Hilton Barnes	1918
John Charles Gebhard	1919
Joseph Howard Christian	1920
Laurence Raymond Wells	1921
Frank Ellsworth Conkling, Jr.	1922

GRADUATES

John Filmore Hayford	1895
Certain Field Methods Used on the Survey on the Mexican Boundary in 1892-93.	
Elon Huntington Hooker	1896
Storage Capacity in Lakes and Reservoirs.	
Erasmus Darwin Preston	1897
The Transcontinental Arc from Cape May to San Francisco.	
John Cassan Wait	1898
Engineering and Architectural Jurisprudence.	
Frederick Eugene Turenaure	1899
Moving Trainload Experiments.	
Clinton Brown Stewart	1900
Gauging of the Niagara River.	
Edward Charles Murphy	1901
The Windmill, Its Efficiency and Economical Use.	
Henry Robertson Lordly	1902
Anti-Friction Bearings.	
William Kendrick Hatt	1903
Tests of Reinforced Concrete Beams.	
Anson Marston	1904
Sewage Disposal in Iowa.	
Willard Beahan	1905
Field Practice of Railroad Location.	
Erwin Ernest Haslam	1906
The Importance of Ice Disposal on large Hydraulic Power Development.	
James Hillhouse Fuertes	1907
Waste of Water in New York and Its Reduction by Meters and Inspection.	
John Clayton Hoyt	1908
Comparison between Rainfall and Runoff in North-eastern United States.	

William Martin Torrance	1909
Special Concrete Structures of the Hudson River Terminal.	
Richard Collier St. John	1910
Supplementary Report on Transportation Subways, No. 1 Location Design, Capacity, Operation, Bureau of Eng. of the Dep't of Public Works, City of Chicago, Ill.	
William Law Bowman	1911
Partnership Agreements for Civil Engineers.	
Daniel Webster Mead	1912
The Flow of Streams and the Factors that Modify It, with Special Reference to Wisconsin Conditions.	
Harry Thomas Cory	1913
Irrigation and River Control in the Colorado River Delta.	
Weston Earle Fuller	1914
Flood Flows.	
John Charles Lounsbury Fish	1915
Engineering Economies.	
Clement Edwards Chase	1916
The Cherry Street Bridge, Toledo, Ohio.	
Frederick William Scheidenhelm	1917
The Reconstruction of the Stony River Dam.	
Ross Milton Riegel	1918
The Hydraulic Jump as a Means of Dissipating Energy.	
George Paaswell	1919
Retaining Walls, their Design and Construction.	
Thomson Eason Mao	1920
Secondary Stresses in Framed Structures.	
Wilson G. Harger	1921-22
Location, Grading and Drainage of Highways.	

The Fuertes gold medals are of a value of fifty dollars each, and are awarded under the following conditions:

The undergraduate medal "will be awarded annually to that student of the School of Civil Engineering who may be found at the end of the first term of his senior year to have maintained the highest degree of scholarship in the subjects of his course; provided he has been in attendance in the University for at least one and one-half years."

The graduate medal "will be awarded annually to that graduate of the School of Civil Engineering who may write a meritorious paper upon some engineering subject tending to advance the scientific or practical interest of the Profession of the Civil Engineer."

The paper will be presented on or before April 15. If a paper is presented in printed form, it will be received only provided it has not been published earlier than the preceding April 15.

THE FUERTES MEMORIAL CONTEST IN PUBLIC SPEAKING

Through the generosity of Mr. C. H. Baker, a graduate of the College of Civil Engineering of the class of 1886, a fund has been created, the income of which is to be used to offer prizes in public speaking for students in the Colleges of Engineering and Architecture. The first prize is \$125, the second \$35 and the third \$20.

Winners of First Prize

R. E. Pierce, M.E.	1913	L. V. Laey, B.Ar.	1917
H. B. Pope, C.E.	1914	C. Ku, M.E.	1918
A. M. Beebe, M.E.	1915	W. D. Ellis, M.E.	1919
H. L. Hoek, C.E.	1916	L. R. Chapman, B.Ar.	1920
I. L. Scott, B.Ar.		1921	

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SCHOOL NOTES

C. E. ASSOCIATION MEETS

The Cornell Student Chapter of the A. S. C. E. held the last meeting of the term on the evening of May 22 at the bark of the Sibley Dog. The evening began with a harmonious crash as Breen's trio filled the air with music. Then Barreto and Breen demonstrated the ancient and dangerous art of fencing to an awe-struck crowd. No casualties were reported.

President Hannigan '22 then called the business session to order and the following officers were elected for the coming year.

President "Felix" Spurney '23
 Vice-president "Don" Breen '23
 Secretary "Mat" Grogan '23
 Athletic Manager "Duke" MacBean '23
 Athletic Adviser Prof. "Howie" Seofield

The treasurer is the business manager of the **Cornell Civil Engineer**, B. H. Palmer '23.

The new officers took their places. President Spurney said the main difficulty with the Association in the past has been the lack of a definite policy. Steps will be taken to remedy this for the coming year. Also the Association, being now a student Chapter of the national A. S. C. E. has added responsibility and usefulness. Every registered C. E. student is a member, may wear the insignia, and is expected to support the Association. With such support there is every reason to hope for the liveliest association on the hill for next term.

The last of the evening was positively hypnotic. J. F. Haller '22 mystified the students and aroused the jealousy of the Professors by securing such complete control over a couple of student members that they willingly and unconsciously obeyed his slight-

est wish. Those present then had the pleasure of listening, we hope not for the last time, to retiring Prof. Jacoby, who gave some fine advice and suggestions from his years of experience as a successful engineer and student. Then as is the custom the evening wound up merrily amid music, sinkers, and coffee.

C. E. HONOR COMMITTEE FOR 1922-23

Results of elections of May 29, 1922

Senior

E. N. SCOTT, '23, Chairman
 T. TELFER, '23
 D. L. COPELAND, '23
 L. R. MAINS, '23

Junior

J. H. LUDLOW, '24
 H. W. NESCH, '24
 P. F. BEAVER, '24

Two members to represent the sophomore class will be elected in the fall.

NEW SMOKING ROOM

On account of the general untidiness which had been caused by smokers in Room 5, the Materials Laboratory, a new smoking room has been made in the basement by partitioning classroom 3 into two rooms. Room 3 was too large for a recitation room and too small for a lecture room so it was deemed advisable to subdivide it and turn one room into a smoking room.

This new room is better adapted to a smoking room than the Materials Laboratory. When the Materials Lab was used there was a tendency for students to enter and smoke while classes were con-

(Continued on page VIII)



Everything Dry But The River

The Central Maine Power Company built its new plant at Skowhegan right into the bed of the Kennebec River.

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INDUSTRIAL BUILDINGS SHOULD BE WELL LIGHTED.

From the employer's viewpoint, the big difference between men who work out of doors and those who perform tasks inside the building, is the factor of light. Daylight furnishes sufficient illumination outside during the daytime working hours for men to pursue their tasks efficiently and safely. But the proposition of getting enough daylight into the interior of industrial buildings, requires some thought.

It is not a difficult problem by any means, and any employer can take advantage of daylight and utilize it for lighting his building during the daytime, if he desires. It is an excellent light, especially suitable for the eyes, reducing eye strain and eye weariness to a minimum, and has the great economic advantage of costing nothing.

To utilize daylight to the utmost, we must first provide means for allowing daylight rays to enter the interior of buildings in sufficient quantity—namely, proper and adequate windows and skylights. Many excellent instances of buildings designed with a due regard to the importance of daylight lighting can now be seen in many of our industrial cities. Such buildings present the appearance of being practically all windows—"window walled," as they are termed—and this type of daylight construction is coming rapidly into favor, because it constitutes a more healthy building for large numbers of employes, both from the lighting and ventilation standpoints.

Among those who have constructed this type of modern industrial building may be mentioned: The Shredded Wheat Co., Gillette Safety Razor Co., Lyon & Healy Piano Co., H. J. Heinz Co., Corona Typewriter Co., Skinners Macaroni Co., Grape Juice Co., Dodge Bros., Nelson Valve Co., Piston Ring Co., Remington Arms Co., and a great many others.

The Larkin Co., Philadelphia, has erected a building almost entirely glass, 85% being windows, and the Loomis Breaker, operated by the D. L. & W. R. R. Co., Nanticoke, Pa., is literally a glass house, being 93.5% of glass. The new buildings of the Winchester Repeating Arms Co. have an average glass area of 58%.

An investigation covering 18 buildings constructed by the Aberthaw Const. Co., Boston, shows that the average window area is 57.5%.

These figures indicate how important the subject of lighting is now considered by employers of industrial labor, and how well the idea has been carried out by the architects and engineers, in order that all parts of a building may receive sufficient daylight. But, in addition to providing ample window space, there is another factor which is equally important, and that is, equipping the windows with the proper glass.

The bright direct rays of the sun should not be permitted to strike the eye, and we must provide a means for reducing the glare to rays which will not be too bright. This is accomplished by glass especially manufactured for industrial windows, known as Factrolite. This glass possesses the property of breaking up the intense rays of the sun and diffusing the light into the interior of the building in proper portions, solving the problem of sun glare.

If you are interested in the distribution of light through Factrolite, we will send you a copy of Laboratory Report—"Factrolited."

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SCHOOL NOTES

(Continued from page 149)

dueting experiments. The new room is smaller, has more chairs in it and emanates the spirit of a smoking room. But alas, it is bare. One or two pictures on the walls and a few magazines on the table would help matters tremendously. If you have an old magazine which you are through reading bring it up and deposit it in the smoking room. It will help one of your classmates while away a pleasant few minutes while smoking.

C. E. BRYANT, JR., '22, WINS SECOND.

In the Fuertes Memorial Speaking Contest between the students of M. E., C. E. and Architecture, we were ably represented by C. E. Bryant, Jr., '22, and F. E. Spurney, '23. The result of the contest was that first prize of \$125 was won by I. I. Scott, '23 Arch., while C. E. Bryant, Jr., C. E. '22, speaking convincingly as a transportation engineer and economic prophet, condemned the St. Lawrence Waterway project to failure and secured second prize of \$35. Third prize of \$20 went to R. C. Van Sickle, '23 M. E. F. E. Spurney, C. E. '23, in his speech advocated the use of cast iron pipe instead of concrete for the construction of the proposed Hudson River Vehicular Tunnel.

The student attendance at the contest was noticeably small, considering the quality and technical value of the speeches, most of which were amplified by the use of diagrams or slides, and considering that Director Barnes had recommended attendance as "an extremely easy way of securing some very

valuable information," but it goes to show that, contrary to the opinion of many teachers, most students don't prefer the easy road.

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VOL. XXXI, No. 1

OCTOBER, 1922



The 1922 Summer Survey Camp. See page 9

Hinckley Reservoir Operation by G. E. Gibson '03



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OCTOBER, 1922

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Test the Materials and then-



(1) Blade cuts through materials with churning action. (2) Blade carries materials up, spilling down again against motion of drum. (3) Materials hurled across diameter of drum. (4) Materials elevated to drum top and cascaded down to reversed discharge chute which (5) with scattering, spraying action, showers materials back to charging side for repeated trips through mixing process.

—remember that it depends on the mixer to combine the raw materials, aggregate cement and water into concrete that actually possesses the latent strength of the materials.

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Vol. XXXI

OCTOBER, 1922

No. 1

EDITORIALS

ELECTIONS

The **Cornell Civil Engineer** takes pleasure in announcing the elections of J. Herbert Ludlow, '24, of Pittsburg, Kansas, and Robert T. Sprague, '24, of New Berlin, N. Y., to the Junior Editorial Board and of Joseph Bevacqua, '24, of Rochester, N. Y., to the Junior Business Board as a result of a competition which closed last term on June 1. The Board wishes to express its appreciation of the work performed by Fred W. Colucci, '24.

A REMINDER

This is just to remind the old students and inform the new students that we have a live and well-functioning Honor System in all the Colleges of Cornell University. Each college has an honor committee of its own which has a representative on the Central Honor Committee of the University. These committees pass judgment on cases brought up as violations of the honor system. The Student Council has published the Constitution of the Honor System in its pamphlet entitled "The Cornell Honor System". Make yourself familiar with it and vow to live up to its every clause.

WELCOME

Another college year starts. Some of our friends of last year are no longer with us. They have gone forth into the world, as college trained civil engineers with high hopes and ambitions. May their hopes be realized, and may they ever hold dear the teachings of their Alma Mater. As time goes on may their high ideals be maintained. Several of our friends will not be with us until February. We hope they will all return with a resolve to strive harder and work more energetically and be more successful next June.

To the new students enrolled in the College of Engineering and especially those who intend to enter the School of Civil Engineering in their Sophomore year, we extend a most hearty welcome. Remember, the first year is always the hardest. Grit your teeth and stick for the first year and you will be grateful to Cornell until the end of your days.

In closing let us call to your attention the last stanza of Professor Martin Sampson's poem, "The Cornell Man".

And when the challenge comes to fight,
Be it 'gainst the hordes of hell,
Think of the place where right makes might,
Cornell!
So, arm you, fit to do your part,
And proud to lead the van,
Go in, dear boy, with all your heart,
And win like a Cornell man!

AN EXTENSION OF INFLUENCE

In the May, 1922 issue of the **Cornell Civil Engineer**, Mr. G. C. Brown, C.E. '06 M.C.E. '09, in his very interesting article upon the history of Cornell Civil Engineers, asks a question (and answers it) which should be of great interest to all Cornellians.

"Why has not the Cornell Society of Engineers (formerly the Cornell Society of Civil Engineers) enjoyed the large growth and great service that engineering societies, in general, have during the past few years"? Although we have not made a deep study of the situation as yet, still a review of Mr. Brown's article leads us to form a number of conclusions which may or may not be in accordance with the solution.

Records show that there are living at present, 1982 Cornell Civil Engineering graduates. Of this number, 792, or only 40 per cent, belong to the Cornell Society. Upon further inspection, it is seen that whereas the center of gravity of the entire alumni is located in Ohio, conforming, in general, to the center of gravity of the entire country, the center of gravity of the Cornell Society is located in south western Pennsylvania, a distance to the eastward of the former. Theoretically, these two points should coincide. Therefore, there must be factors existing which tend toward localizing the membership of the society in the extreme eastern part of the country whereas the governing factors should promote a generalization of the society along this very important line.

The society always holds its annual meetings in New York City and it is only natural that alumni living within a convenient distance of the central

organization should join more quickly, for, without prohibitive inconvenience to themselves, they may have the full benefits of the society, whereas the alumni living in the West or Middle West find it impractical and in many cases impossible to make such a trip, even in such a good cause.

To secure a more general membership, and the benefits attending such an expansion, we endorse Mr. Brown's plan, that a more centrally located city be chosen as the site of the annual meeting, one which is accessible to all. This, at first, might appear to be a radical suggestion, but the fact remains that the society does not enjoy the rating which we would like it to have and we therefore suggest this remedy in the absence of convincing argument to prove its unreasonableness.

We would like to see this question freely discussed in the columns of the **Civil Engineer** and we would also like to see a petition sent to the Society endorsing measures and changes which would be of benefit to the Society in general. We would be glad to print articles upon this subject from those who are interested, or, better still, discussions may be sent direct to the corresponding secretary of the Cornell Society of Engineers, Mr. C. R. Harding, C. E. '10, 165 Broadway, New York City.

POINTS

If all the Engineers had passed favorably upon the Point System in the recent straw vote held by the Student Council to determine the student sentiment upon the question, the measure would have been adopted. Less than 15 per cent of all the students voted, and it is reasonable to suppose that less than 15 per cent of the Engineers showed interest by voting. Yet the modern Engineer should be the most active of all men in adopting or condemning such measures.

At the present day there is continual and increasing agitation for the replacement of the present wasteful and inefficient methods of government of nation, state, county, town and private industries by efficient methods based upon the application of engineering principles to the administration of human affairs. This application is being brought nearer and nearer each day, as its need is being constantly emphasized by the numerous examples of present inefficient and corrupt methods of government. And, of course, it will be the engineer who will be required to make the application, and to do it he will have to occupy high executive and administrative positions.

It is certain that engineering training can be applied with great success, and will be applied more and more as its true worth is recognized. The shining example today of engineering methods applied to human problems is the work of Herbert Hoover, who graduated from Leland Stanford as a mining engineer, and whose remarkable achievements are known to all. It is also commonly admitted that it is engineering methods that made

these achievements possible. Human engineering will become more important and desirable as the reins of power slip into the hands of men who have an understanding of engineering methods.

This new and broad field offers great rewards of power and wealth to the engineer who succeeds, for he will not only be a master of materials, as other engineers, but also a master of men. However, experience and study is a prerequisite for such important positions in the world, and we should seize the opportunity to get a start in this experience and study, while in school, by thinking and acting upon the human problems that arise in the administration of university, college and club.

For instance, would the Point System raise the efficiency of Cornell? The modern engineer should be better able to arrive at a sound conclusion on that question than the lawyer or the arts man. Let's find and strongly push the good and efficient plans for changes in our governing rules and condemn the others. By both thinking and acting on all such plans we can help Cornell—and also ourselves.

LINCOLN HALL AS A FIRE HAZARD

Did you ever think whether or not Lincoln Hall would burn easily and quickly if it once caught fire?

Lincoln is a very old building having been standing several decades. The wooden framework, which has never been treated with any kind of fire-proofing material, is now thoroughly dried and very inflammable. It would make the best kind of kindling wood. Also practically every room is equipped with good kindling wood in the form of well dried desks and seats. The floors of the building are of Georgia Pine and are well oiled. What more could a fire desire? With no other help than a little spark to start it the main building would quickly shoot up in flames before the Ithaca Fire Department or any other fire department could arrive. The two broad staircases at each end of the building offer excellent passageway for the flames from one floor to the next.

For protection the building is equipped with several small hand fire extinguishers and two fire hoses on each floor. This fire hose is neatly coiled and already attached to a hydrant and would seem to be ready for immediate action. However we learn in Water Supply, Course 230, that the hose is of old, weak fabric and if ever attempted to be used would burst at the first attempt. So there is absolutely no fire protection there. Where is there any protection against fire? The answer is—there isn't.

We must conclude then that Lincoln is the very antithesis of a modern fire-proof structure. Its only safeguard against a disastrous and costly conflagration rests in the carefulness of those who use its drawing rooms and recitation rooms. Smoking on all floors, except the concrete basement floor, is, under present conditions, a menace to the building. Therefore, watch your smoke.

Hinckley Reservoir Operation

By G. EDWARD GIBSON, C. E. '03
Assistant Engineer, New York State Engineer's Office

A Round Million Dollars is What the Operating Diagram, Shown in this Article, is Worth to a Big Power Company. Its Designing Engineer Explains The Details.

AS PROPOSED in the Barge Canal report of 1901 and as actually carried out in construction, a portion of the water-supply for the Rome summit level of the New York State Barge canal is secured by the construction of reservoirs on the Mohawk river at Delta, about four miles north of Rome, and at Hinckley, on West Canada Creek. Water from the Delta reservoir passes down the Mohawk river directly into the canal at Rome. That supplied from Hinckley is passed down West Canada creek to Trenton Falls, thence diverted through a feeder canal into Nine Mile creek which enters the summit level east of Rome. The Delta and Hinckley reservoirs have, respectively, drainage areas of 140 and 373 square miles; water-surface areas at elevation of spillways 4.33 and 4.45 square miles; effective storage capacities below spillway crest of 2,700 and 3,324 million cubic feet, which are equivalent to 8.30 and 3.84 inches of depth over their respective drainage areas. The reservoir at Delta has been used as a storage reservoir since early in 1914 and that at Hinckley since January, 1915.

Extensive water-powers are located on West Canada creek at various points between the Hinckley reservoir and the Mohawk river at Herkimer. The largest, that of the Utica Gas and Electric Co. at Trenton Falls above the point of diversion for canal supply, was more than trebled after the construction of the Hinckley reservoir and now has a capacity of 24,000 KW (4-1200 and 3-6400 KW units) with a gross head of 265 ft. and an average working head of about 256 ft. This company had planned the future construction of a storage reservoir near Hinckley and had acquired a portion of the necessary land. The State appropriated most of the land for part of the reservoir site. The company filed claims aggregating \$1,119,425.00 for the land, etc., but principally for the loss of the control of the regulation of the stream through being prevented from building its own reservoir. If the power company could be guaranteed a proper regulation a more advantageous settlement by the State would be made possible. Mr. W. B. Landreth, consulting engineer to the State Engineer, and who had been handling the summit level water supply since 1905, assigned to the writer the devising if possible of some such method of regulation.

Consideration of the matter will show that such a regulation of the Hinckley reservoir as will distribute the water not needed for canal purposes

during the water year so as best to provide for the use of power downstream not only will be the most advantageous use for power but also will relieve the State from liability for diversion from the stream.

Various studies made of the possibilities of the Hinckley and Delta reservoirs for canal supply had been based upon what might be termed a "perfect operation." As such operation was impossible of attainment, the problem resolved itself into finding a practicable, logical method of regulating the reservoir, to be used in place of the usual method of operation, i. e., dependence upon individual judgment, particular knowledge of the watershed, and more or less guesswork. The method sought should be both practicable and positive and should approach within a reasonable limit the results shown as theoretically possible by the previous studies. Such a method has been devised. An actual physical try-out of this method by its application to the operation of the Hinckley reservoir for a period of over a year substantiates both the computation test and the method.

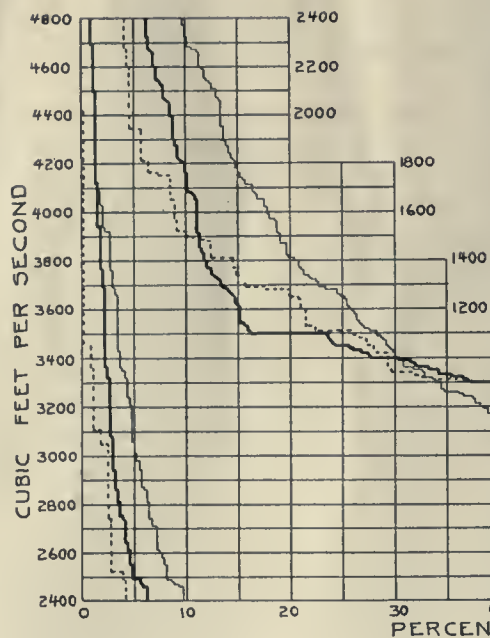
The reasons for the method devised and the results secured are as outlined below.

Storage Available

Storage above the crest of the 400 foot spillway, elevation 1,225, was disregarded, as it is impossible to retain it artificially and any appreciable amount will pass off over the spillway in a couple of days at most, when the inflow falls off. The lower limit of storage was taken at elevation 1,173.5, this being the surface required to pass 230 second-feet through one gate opening. An area and volume curve was prepared, based on the water-surface areas at 4-foot intervals, the surface curve being drawn and volumes computed for each foot of elevation, both in cubic feet and as inches depth over the watershed, the latter being the unit used in all calculations. The total reservoir capacity between the above limits is estimated as 3,324 million cubic feet, or 3.84 inches depth over the watershed. For effective flood elimination and any approach to complete regulation the reservoir should have a capacity of about 12 inches over the watershed. Complete regulation for the 12 years 1907-1918 giving 949 C. F. S. would require 30.14 inches.

Water Required for Canal Supply

The season of canal navigation, that is, the period during which water drawn from the reservoir will be diverted from West Canada creek for the supply of the summit level of the canal, was assumed to be



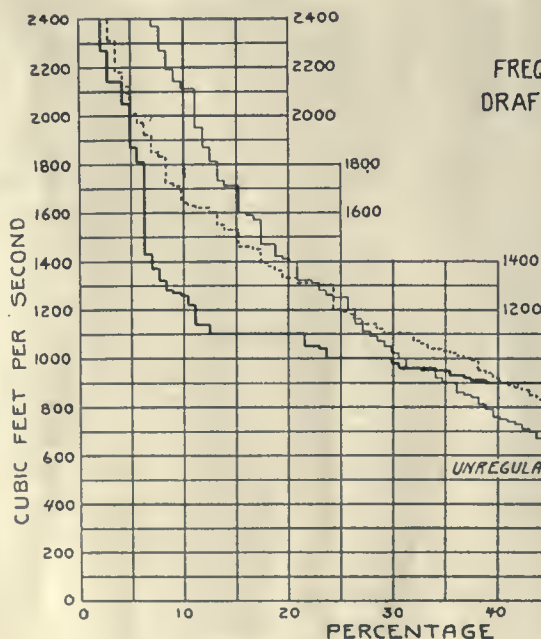
HINCKLEY RESERVOIR REGULATION FREQUENCY CURVES OF UNREGULATED FLOW AND DRAFTS WITH PERFECT AND PRACTICAL REGULATION 1907-1915

Unregulated = Natural inflow less evaporation.

Practical = Draft if operating diagram of Dec. 14, 1920 had been used.

Perfect regulation is for maximum uniform flows below canal diversion taken as averaging 200 C.F.S. May - Nov. inclusive.

All based on means for thirds of months.



HINCKLEY RESERVOIR REGULATION FREQUENCY CURVES OF UNREGULATED FLOW AND DRAFTS WITH ACTUAL AND PRACTICAL REGULATION 1915 - 1918

Unregulated = Natural inflow less evaporation.

Practical = Draft that would have been drawn if operating diagram of Dec. 14, 1920 had been used.

Actual = Regulation before practical method was devised.

All based on means for third of months

from May 1 to November 30, inclusive. Of the total canal supply required from Delta and Hinekley reservoirs only so much of the Hinekley draft should be diverted from West Canada creek as is necessary to augment the Delta draft to the amount required. The amount of this diversion depends upon how efficiently the Delta reservoir is operated.

Reserve

It at first appeared advisable to hold some storage in both reservoirs during the canal season as a reserve to replace the draft from the other reservoir, should it be interrupted by any cause, the greater portion of the reserve being held in the Delta reservoir, because of its small liability to interruption. A reserve equivalent to 200 second-feet draft for one month (0.6 inch over the watershed) in the Hinekley reservoir was considered sufficient to provide for an interruption of the Delta draft not exceeding one month's duration. This reserve was to be maintained to within one month of the close of the canal season (taken as December 1) and proportionately throughout the month. This gave a net effective storage from May to November of 3.24 inches on the watershed.

The operating diagram dated April 16, 1919, was constructed on the above basis. The small probability or rather almost impossibility of the supply from Delta being interrupted was later considered as warranting the elimination of a reserve in Hinekley and this was done in the operating diagram dated December 14, 1920, referred to hereafter.

Mass Curve

The preliminary studies had been made with a mass curve of the monthly means and a reservoir capacity of 4 inches, as compared with the 3.84 inches used in this more detailed study. The use of the monthly mean requires certain equalizing storage necessary to produce the equivalent mean flow used. This amount varies with each month and is occasionally of considerable magnitude. The allowance, therefore, of an average amount of storage would not eliminate this error to the extent desired. From an inspection of the daily discharge record it appeared that by using the mean for a period of one-third of a month the necessary equalizing storage would be reduced to an amount that could be disregarded and this period of one-third of a month was adopted for this study. In studying the mass curve all these periods of one-third of a month were considered as of equal length and one inch on the watershed as equivalent to 1,000 (actually 990) second-feet for one-third of the average month. This approximation, which considerably reduced the labor of computation, is well within the probable error of the base data. Its only appreciable effect is for the last two-thirds of February, each only nine days long, during which the approximation gives a lower draft rate in second-feet than a given depth in inches would actually produce in the shorter time.

Possibilities of Reservoir

The Hinekley reservoir, while amply large to supply necessary storage for canal water, is not large enough for effective flood elimination or to permit of drafts that are uniform in different years. It can at best be used to smooth out the natural flow and to augment it through the low stages. Flood elimination is not primarily attempted in this method of operation, a maximum draft through the gates of 1,530 second-feet being used at first but later reduced to 1100, (an amount ample to supply the requirements of any existing or probable water-power installation on West Canada Creek.

There will, of course, be considerable reduction of flood peaks by reason of the effect of the spillway crest and the surface storage above the crest necessary to secure the required head, in addition to the elimination of that portion of a flood required to fill the reservoir.

As the inflow varies considerably from year to year both as to the amount and the time of occurrence and as the reservoir capacity is too small to hold water from one water year to another, a perfect operation of the reservoir as determined from the mass curve requires uniform rates of draft, which for the same calendar periods differ greatly for different years. To illustrate, the theoretically perfect operation of the Hinekley reservoir for the eight years 1907-1914, inclusive, gives for the middle third of the several months drafts in second-feet varying between the following limits:

January	460 to 1,383
February	599 to 1,518
March	599 to 1,650
April	1,340 to 3,460
May	837 to 2,490
June	427 to 1,110
July	427 to 737
August	427 to 737
September	427 to 775
October	427 to 961
November	430 to 1,383
December	440 to 1,383

From the above it will readily be seen that since the storage capacity is constant the great variation in the perfect draft is due to differences of inflow. If definite drafts operative every year are adopted for various periods, these must be fixed at least as low as the minimum given above to ensure their continuance. On the other hand if a low draft is used, the result will be that the reservoir will fill up more or less rapidly, depending on the inflow, until it discharges over the spillway and the draft is thus increased to approximately the inflow and the regulative value of the reservoir is lost. That is, the proper draft depends upon the inflow and the storage on hand.

It therefore appears that the best results will be obtained by a draft whose amount is influenced by

the inflow; and that is the basis of this method of operation. The future inflow has a relation to the past inflow—a relation which is admitted to be rather intangible, but still is believed to exist. The influence of the inflow is reflected by the amount of storage in the reservoir at any time.

The draft to be drawn at any time is an amount whose maintenance for some time is ensured as possible by the storage on hand and the future inflow as based on past records. The draft is influenced by the actual inflow and is modified at the end of each third of a month. In actual operation the amount is to be determined by an operating diagram from the amount of storage on hand as shown by the elevation of the reservoir water-surface, read from a staff gage by the gate operator.

Construction of Operating Diagram

The eight-year period—1907 to 1914, inclusive, for which a practically continuous record existed—was taken as the basis for the study. A period covering the next four years, 1915 to 1918, inclusive, during which the reservoir was in operation, was reserved for a test period, to be considered as years of future and unknown inflow. No data regarding the flow during this 4-year test period was considered or used in the study for the construction of the operating diagram. The amount of inflow, draft and storage used in the study were expressed as the equivalent depth of run-off in inches over the watershed. The total inches net inflow (less evaporation) for each month is with a few exceptions that compiled by Mr. Landreth and used in the earlier mass curve studies. A mass curve was constructed, using the mean net inflow for each third of a month for the basic period 1907 to 1914, inclusive. From this mass curve, considered as a cycle, the maximum uniform drafts possible with amounts of storage varying from an empty to a full reservoir were determined for the date beginning each third of a month throughout the year, using successively the recorded inflow for each of the eight years. From the data for each such date the drafts for various amounts of storage were determined for that date. By plotting these drafts for various amounts of storage for each third of a month period in chronological order, an operating diagram was constructed. The operating diagram shows varying rates of draft for varying amounts of storage at the beginning of each third of a month throughout the year. The draft at any date is constant for storage above the crest, which, as noted above, was disregarded, and also above certain maximum draft limits. The draft is also constant below elevation 1,173.5. The operating diagram was then applied to the 8-year basic period and certain minor changes, which appeared desirable, were made.

Results

The finished operating diagram was applied to the 8-year basic record and hydrographs and time per-

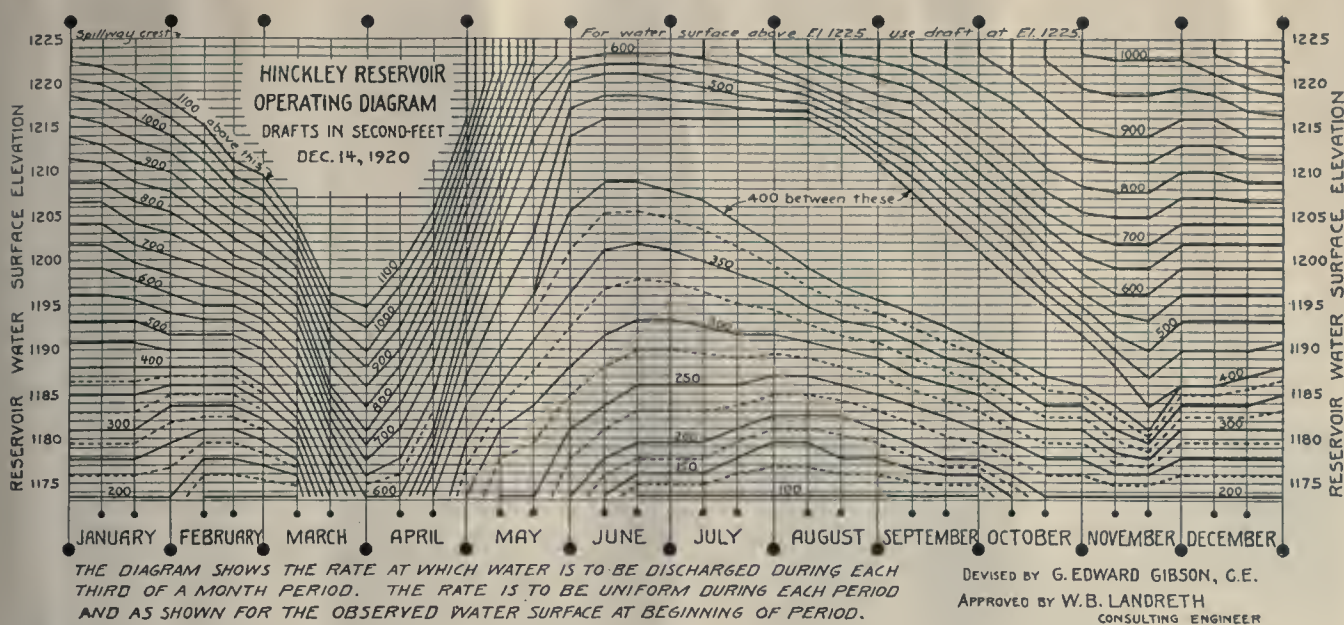
centage, or frequency, curves were plotted, showing the natural inflow and the draft by this practical regulation by using the diagram and what could be obtained by a theoretically perfect operation, which is only possible through hindsight, but which is the maximum limit we are endeavoring to approach. As a test the operating diagram was applied to the 4-year period, 1915 to 1918, inclusive, which has not as yet entered in any way into the computations. This is a test as near to the actual operation of the reservoir as can be made, for, with respect to the operating diagram, these are future years. Similar hydrographs and time percentage curves were constructed. Combined hydrographs and time percentage curves for the 12 years were constructed.

In applying the diagram to the 12 years data the indicated draft was maintained in all cases for one-third of a month. In actual operation it may occasionally prove advantageous at the beginning of the spring flow to increase the draft before the end of the third of a month period in order to anticipate and ease off a very great change of draft resulting from a rapid accumulation of storage due to the continuance of the probable relatively lower draft in use before the start of the spring flood. While this may be done occasionally the rule is that the indicated draft should be maintained throughout the third of a month period irrespective of all changes of storage.

This method tends in itself, although varying the draft, continually to approach a proper draft and to compensate for errors. That is, if the amount of draft is too large, the storage is lowered and a lowered draft results; if this lowered draft should be too small, the storage increases and a larger draft is indicated. It was found that, starting with different amounts of storage and the same sequence of inflow, the two sets of successive drafts approach each other and soon coincide. As the draft should be maintained uniformly throughout the period, a change of water-surface necessitates a change in the gate opening to maintain a constant draft with an increased or decreased head. However, if this is not done, it may not ordinarily be a serious misoperation, because the draft affected by the change in the water surface would automatically approach the probable draft for the following period. The amount of this automatic change of draft due to change of water-surface would, of course, be greatest at the lower stages of the reservoir and might be more than desired. The possibilities of this automatic easing of changes of draft have not yet been investigated.

Operation by Diagram

The proper actual operation of the reservoir by this proposed method would be as follows: At the beginning of a one-third of a month period the operator would read the water-surface elevation of the reservoir. By consulting the diagram he would find at the intersection of the proper date line and the water surface elevation line the desired draft in



cubic feet per second. He would then from a gate-setting table, or diagram, determine the gate opening for the desired draft with existing water-surface. He would then set the gates at this opening. After the flow had become stable, a matter of probably one to six hours, depending upon the magnitude of the change, he should check his gate setting by the discharge indicated at a stream measurement station below the dam. For this purpose he should be furnished a rating table for the station. During the time the station is affected by ice this check could not, of course, be made by the operator, such check being possible only when the regular current-meter measurements are made. If the actual discharge as indicated by the stream measurement station differs materially from the desired draft, he should then correct his gate opening. The operator should observe the water-surface during the remainder of the period and make such changes of the gate opening to maintain the desired draft as are necessitated by the fluctuations of the water surface. Whenever the surface of the reservoir rises so that water passes over the spillway, the gate opening should be reduced by such an amount that the combined flow over the spillway and through the gates will equal the desired draft. The actual draft from the Hinckley reservoir, both through the gates and over the spillway, is measured at a current-meter station about one-third of a mile below the dam. The station is equipped with both staff and automatic recording gages and a cable with ear for current-meter measurements at higher stages of the stream. This station was placed in operation in June, 1919, and has been free from ice. The station is maintained by the United States Geological Survey in cooperation with the State Engineer's Department.

Physical Test of Diagram

Although the computed results of the four years test period referred to above convinced us that this method of operation would prove successful, it was

deemed advisable, before completing the study, to test the method by actual use of the operating diagram of April, 1919, in regulating the Hinckley reservoir for at least a year, in order to be sure that no practical difficulties of operation had been overlooked and to discover anything else that might affect the operation by actual use. The Utica Gas and Electric Co. agreed to waive interest for this year on whatever award they might eventually receive. The completion of the study and the determination of the final diagram was therefore suspended, pending the actual physical tests. The operating diagram of April, 1919, was put into actual use in the early fall of 1919. No trouble other than incidental to the training of operatives was experienced.

In actual practice the diagram appeared to work successfully. After the spring freshet, which the size of the reservoir is not sufficient to prevent, there were no flood flows over the crest of the spillway during the 1920 canal season. This elimination of floods during the canal season was of great benefit to canal navigation, since it prevented a possible interruption of navigation, which might have resulted from too high velocities in the canalized Mohawk river.

A comparison of the rainfall on West Canada creek watershed for the years 1909 to 1918, inclusive, with that of the year 1920 shows that the rainfall in the latter year was very irregular. In the months of January and May, 1920, the rainfall was lower than the minimum of those months of the other years, and the rainfall in 1920 for June and October was considerably less than the mean rainfall of the other years for those months. For the months of July and December, 1920, the rainfall was greater than the maximum for those months for any of the years noted, and April, 1920, almost equaled the maximum.

As regards rainfall the year 1920 was one of extremes in both directions. The inflow during the

last of May and June was such as to require a draft on the storage earlier in the canal season than is usually necessary. The fact that the operation of the reservoir in accordance with the diagram was successful in an abnormal year is to a certain extent a measure of its adaptability.

Modification of Diagram

Further consideration and determination of what might be termed external conditions warranted a modification of certain results, which it was desired that the diagram would ensure, as follows:

(1) In view of additional pondage projected by the Utica Gas and Electric Company for their plant at Trenton Falls the maximum uniform flow desired by that company at its plant is 1,100 feet per second, and as no material effect on flood regulation would result by the change, the maximum indicated draft of the diagram was reduced from 1,530 to 1,100 second-feet.

(2) As noted above the reserve which it was first thought desirable to retain in the Hineckley reservoir, amounting to 0.6 inch over the watershed, or 520 million cubic feet, was eliminated, thus increasing the available storage during the summer about 18½ per cent.

(3) The minimum desired draft during the canal season, i. e., May to November, inclusive, was raised to 400 second-feet to ensure a more than ample flow in West Canada creek below the point of diversion for the canal supply in order to eliminate any possibility of claims being brought in the future against the State on account of diversion.

(4) It was desired if possible to increase the draft during June and July.

With the above points in view a modified operating diagram, dated December 14, 1920, (see accompanying diagram), was constructed by the same method as the earlier one. The elimination of the reserve gave a greater storage for use with the mass curve in determining the maximum possible draft for varying amounts of storage. These drafts were drawn to ensure uniform flow below the point of diversion. Diversion for canal supply was taken as averaging 200 C. F. S. May to November inclusive. The desired maximum and minimum drafts affected the determination of the drafts for various amounts of storage for the third of a month periods. Exactly the same principles were employed in constructing the two diagrams, but the limits governing their application were of different degree.

Value of Regulation by Diagram

A comparison of the computed results of the practical regulation by the operating diagram with the actual draft from the reservoir during the four years, 1915 to 1918, inclusive, was made, and the results are shown by frequency curves on accompanying diagram.

The computed results of the modified diagram for

the 12 years, 1907-1918, inclusive, show that during the canal season a draft of 400 second-feet or greater could have been maintained with the exception of one one-third of a month period, when the draft drops to 360 second-feet. The minimum mean flow for one-third of a month period is raised from 40 second-feet to 230 second-feet.

The benefit of the regulation is shown concisely by Table No. 1, which gives for various percentages of time the amount at and above which the flow would have been maintained for that proportion of these 12 years. This is shown graphically by the accompanying frequency curve.

Table No. 1

Hineckley Reservoir Regulation

Comparison of Results, Proposed Regulation by Operating Diagram dated December 14, 1920, with Natural Inflow and 100%-Efficient Theoretical Draft, for 1907-1918.

Percentage of Time	Natural inflow in second-feet	Drafts in Second-feet		Increase in second-feet of inflow by practical regulation	Ratio of practical regulation to natural inflow	Ratio of practical to theoretical regulation
		Practical	Theoretical			
50	560	740	790	180	1.321	0.937
55	480	660	750	180	1.375	.880
60	440	600	710	160	1.364	.845
65	370	590	680	220	1.595	.868
70	320	520	670	200	1.625	.776
75	280	490	620	210	1.750	.790
80	240	440	550	200	1.833	.800
85	210	400	480	190	1.905	.833
90	180	400	470	220	2.222	.851
95	130	400	460	270	3.077	.870
98	100	310	460	210	3.100	.674
100	40	230	260	190	5.750	.885

Amounts, in second-feet, are those at or above which flow occurred for given percentage of time, based on means for thirds of months.

Natural inflow given is net inflow, i. e., less evaporation.

Theoretical draft is for maximum uniform flow possible with Hineckley storage, below point of diversion for canal supply.

Average diversion estimated, 200 second-feet from May to November inclusive.

The claim of the Utica Gas and Electric Co. for \$1,119,425.00 was settled in 1921 by the State agreeing to operate the Hineckley reservoir in accordance with the operating diagram of Dec. 14, 1920, and the payment to the company of \$100,000.00 which approximated the cost of the land with interest from date of appropriation. The settlement also covered the matter of possible future additional storage by the power company.

Mr. Byron E. White, Engineer of the Utica Gas and Electric Co., states in a letter of Feb. 7, 1922, that an additional, the third, 6400 KW unit was gotten into service that week and also:

"As to the working out of the regulation scheme I desire to say that we have obtained very good results so far as we have analyzed them and we feel quite well satisfied with it. We know that we have received a substantial increase in the available output from the stream flow. We also realize that it is a great advantage to eliminate the constant friction which would have undoubtedly occurred were it not for a set scheme of regulation."

"While we do not always make use of all the storage capacity of the reservoir, due to irregular

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Report of 1922 Camp

By F. K. LOVEJOY, Chief Engineer

An Account of Some of the Activities Which Took Place at Aurora-on-Cayuga Last Summer

Work in preparation for the annual summer C. E. Camp, held annually for students of C. E. and Forestry, began in earnest for us on Saturday, June 10, though the Professors and workmen at Lincoln had been busy for weeks, packing, shipping, and making arrangements. On Saturday the personal baggage of all the campers was gathered and loaded on the baggage car that had been set aside for our use. Each man had turned in a card, giving his address and details concerning his baggage. These cars were sorted by the camp officers and on Saturday, by means of two University trucks and a half-dozen volunteers and conscripts, the baggage was gathered and stowed in the car.

On Monday morning about one hundred campers left Ithaca on the 7:40 train for Aurora. When we arrived about nine o'clock we found the camp site, though an excellent location, well covered with water from the heavy rains of the preceding day. The men were divided into squads and the work of erecting camp was begun. The swampy condition of the ground and the high wind made this a task of no small proportion. The living and computing tents were placed in a field on a small bluff overlooking Cayuga Lake, about a mile south of the village of Aurora, while the mess and cooking tents were erected at the foot of the hill on the water's edge. The westerly wind had blown enough water up to completely flood the site for the mess tents. However, with ditches dug to drain the field and the mess tent gang working in hip boots, the camp was well erected by nightfall.

The first evening of camp was a pleasant one. The Wells College girls gave a closing dance and whether the camp was invited or not made little difference, for many fellows were on hand in clothes that might well have been thought unsuitable for such an affair. However, the following night Wells College was only a group of empty buildings and of no interest to Civil Engineers.

The following day about half the camp were able to get out and started on their assigned plots, while the remainder completed the work of erecting the camp. The field work of this and the following day consisted mainly in making adjustments and in trying to follow all the steps necessary to get the azimuths of the lines. But by Thursday nearly all the first traverses had been completed and due to the unusual but efficient scheme of measuring angles, the traverses checked reasonably well.

When we returned Thursday night we were surprised to discover regular electric light fixtures in the tents. Professor Underwood, who was in charge



of the camp, had been able to borrow a generator from the Agricultural College and instead of oil lamps and lanterns we had good electric lights. They were especially valuable in the computing tents, but in the small tents they were not so much appreciated for we hardly returned to them before the power was shut off for the night.

Hydrography started by the end of the week. The reason for the delay might have been that it took one week to start the engine in the boat after a year's rest, for it took an hour to start it after a night's rest. The Captain used ether with varying success to prime it. Professor Boothroyd told him that, as might be expected, the ether put the engine to sleep, but the Captain seemed to have his own ideas on the subject. The first two days of this interesting part of the work consisted in putting up signals, but by the beginning of the second week regular Hydrography work was begun and all went smoothly until the end of the week, when the crank shaft of the engine broke. Fortunately the outboard

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In Memoriam

Frederic Schoff, B.C.E. 1871.

Frederic Schoff died of heart failure on February twenty-seventh, 1922, at his home, 3418 Barring Street, Philadelphia, Pa.

Schoff was born at Lexington, Mass. on October twenty-fifth, 1848, and was the son of Stephen A. Schoff, noted artist and steel engraver and Josephine (Hastings) Schoff, of Newton, Mass. He was a lineal descendant of John Robinson, minister of the Pilgrim congregation at Leyden, and of John Schoff who served in Washington's bodyguard at Valley Forge and fought throughout the Revolutionary War.

After receiving his preparatory training in the public schools at Newtonville, and working in the City Engineer's office at Boston, Mass., Schoff entered Cornell at its opening in 1868 as a member of the sophomore class and received the degree of B.C.E. in 1871. Returning to his home in Massachusetts, Schoff was elected the first City Engineer of Newton after its incorporation as a city and had much to do with its development.

In 1877 he moved to Philadelphia and entered the newly established Stow Flexible Shaft Co. as Manager. Soon after he took over the business and built it up, remaining as owner until his death. He is survived by his widow, Hannah (Kent) Schoff, whom he married at Clifton Heights, Pa., in 1873, and seven children, two of whom graduated from Cornell, two from Harvard and two from Bryn Mawr.

Schoff was a Director of the Philadelphia Bourse from its inception and took an active part in building their handsome quarters. He was a life long member of the Church of New Jerusalem and served as President of the Board of Trustees. He was also a Director of the First National Bank of Clifton Heights, Pa., and member of the Union League, the Sons of the Revolution and the Historical Society of Pa.

Although not actively engaged in engineering he was a member of the Atlantic Deep Waterways Association and was active in promoting the project, attending all the conventions as a delegate.

He was a member of the Delta Upsilon fraternity and of the Cornellian Council. He was devoted to Cornell and always attended the reunions of his class, the last of which, the fiftieth, brought back to Ithaca half the remaining members of the class.

He was honored, respected and loved by all who knew him and the above record is evidence that he lived a useful and active life.

Louis Falkenau, B.C.E. 1873, C.E. 1877.

Louis Falkenau died at Milwaukee, Wis. on August twenty-first, 1921. Falkenau received the degree of B.C.E. in 1873 and that of C.E. in 1877. He was a prominent contractor in Chicago for many years but retired from active service about five years ago.

Carl Hess Niemeyer, C.E., 1891.

Carl H. Niemeyer died on March 4, 1921 at Williamsport, Pa. where he held the position of Assistant Chief Engineer, East Region, Pennsylvania Railroad.

Graduating from Cornell with the degree of Civil Engineer in 1891, Niemeyer entered the service of the Pennsylvania as a Rodman on the old P. and E. Division in January, 1892. He was promoted to Assistant Superintendent in 1893 and was made Assistant Supervisor in 1897. In 1900 he was made Supervisor on the Philadelphia Division and served in this capacity on various divisions before becoming Division Engineer in 1905. In September, 1916, he was promoted to Assistant Chief Engineer, Maintenance of Way, with headquarters at Philadelphia. About a year ago he went to Williamsport, Pa., as Acting Engineer of Maintenance of Way, upon the retirement of H. C. Nichol, under General Superintendent H. M. Carson, of the Central Pennsylvania Division, and held that position until his death.

Niemeyer was held in high esteem by all of his associates on the Pennsylvania System. He was a member of the Engineers Society of Pennsylvania and of the American Railway Engineering Association.

Thomas Martin, Jr., C.E., 1909.

Thomas Martin, Jr. died at Lansdowne, Pa. on March eleventh, 1922, from an attack of influenza.

Martin was the son of Thomas Martin and Elizabeth (Donaldson) Martin and was born at Londonderry, Ireland on September first, 1882. He received his preparatory education in the public schools of Belleville, N. J. and the Franklin and Marshall Preparatory School. Receiving his degree of Civil Engineer from Cornell in 1909, Martin returned to Belleville and worked as surveyor and engineer's assistant until September 1910 when he entered government service.

He was at first Sub-Inspector and later Structural Aide at the Brooklyn Navy Yard. From 1912 to 1917 he made subsurface and topographical surveys at various Navy Yards on the Atlantic Coast. From 1917 to 1922 he was Chief Inspector on contract work for many large structures at the Philadelphia Navy Yard. At the time of his death he was Structural

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ALUMNI NOTES

'72. Among the thirty-two members of the first full four-year class to hold a fiftieth reunion, who registered last June were the following civil engineers:—Milford C. Bean, McGraw, N. Y.; Gram Curtis, New Castle, Pa.; Rufus B. Howland, Trumansburg, N. Y.; Prof. Sylvester N. Williams, Oak Park, Ill., and Henry L. Stewart of Ithaca, N. Y., the last of whom is Life Secretary of his class, having succeeded the late Professor Crandall in that position.

'77. The W. J. Sherman Co., Consulting Engineers of Toledo, Ohio, has been retained by the city of Wellsville, Ohio, to prepare plans and specifications and superintend the construction of a new water supply system. The firm is also preparing preliminary plans for sanitary and intercepting sewers and a disposal plant for Port Clinton, Ohio.

'85. In the August Proceedings of the American Society of Civil Engineers James B. French discusses the Tentative Specifications for Steel Railway Bridges submitted as a progress report by the Special Committee on Specifications for Bridge Design and Construction. French stopped off at Ithaca a short time in August while on his way to visit relatives in Groton.

'85. Notice has been received of the retirement from active practice of William C. Smith, who has been a prominent figure in the development of railroads in the Northwest for some thirty-five years. His present address is 434 West Fifteenth Ave., Spokane, Wash.

'86. Professor Charles B. Wing of Stanford University, Palo Alto, Calif., spent the summer in the East. He attended the meeting of the American Society of Civil Engineers at Portsmouth, N. H., last June and visited his brother, Professor Hiram H. Wing of the College of Agriculture, at Ithaca later in the summer.

'88. James H. Edwards, Assistant Chief Engineer of the American Bridge Co., has changed his office address from 30 Church Street to 71 Broadway, New York City.

'90. Frederick K. Wing, President of the Frederick K. Wing Co., Engineers, of Buffalo, N. Y., dropped in at Lincoln Hall this summer.

'91. Dr. William K. Hatt, Director of Highway Research for the National Research Council, read a paper on "Progress in and Importance of Highway Research" at the June meeting of the American Society of Civil Engineers at Portsmouth, N. H. The paper is published in the August number of the Proceedings of the Society.

'91. Arturo Rodriguez of San Juan, P. R., attended the reunions last June and spent part of the

summer with his family at his cottage on Lake Cayuga.

'92. Col. William G. Atwood, Director of the Committee on Marine Piling Investigations of the National Research Council, read a paper on "Marine Borers" at the Portsmouth meeting of the American Society of Civil Engineers last June. The paper is published in the August number of the Proceedings of the Society.

'92. Hubert K. Bishop, Chief of the Division of Construction of the U. S. Bureau of Public Roads, had an article in the May issue of *Cement Age* on Concrete Road Specifications.

'92. John P. P. Lathrop has changed his address to Wynnewood, Pa.

'92. Among those who helped the class of '92 establish "Old Cornell ain't what she used to be, thirty years ago" as the "national anthem of the reunions" last June were the following Civil Engineers: Col. William G. Atwood, Roscoe C. Beebe and Prof. John C. L. Fish.

'97. Seven Civil Engineers attended the twenty-fifth reunion of their class last June. They were Fred A. Barnes, Homer F. Cox, Charles F. Hamilton, John C. Hoyt, I. W. McConnell, William F. Ohl and Benjamin E. Tilton.

'98. Robert H. Anderson has changed his address to care of the Tennessee Power Co., Parkville, Tenn.

'99. Egbert J. Moore was in Ithaca on the first of September.

'00. Squire E. Fitch is now County Engineer for Chautauqua County, New York, with headquarters at Jamestown.

'00. Weston E. Fuller has accepted the position of Professor of Civil Engineering at Swarthmore.

'01. Lawrence Johnson is Works Manager for the Agricultural Implement Co., Ltd., Talanagar, India. Johnson is a Member of the American Society of Mechanical Engineers.

'01. Roger B. Williams, Jr., has opened an office at 67 Wall Street, New York City, for financial readjustments and reorganizations of railroad and industrial corporations.

'04. Thomas M. Foster has changed his address to 1309 Seventh Street, New Orleans, La.

'04. A daughter, Eleanor Margaret, was born to Mr. and Mrs. Ross M. Riegel of Pittsburg, Pa., on August thirteenth.

'05. W. S. Fitz-Randolph has changed his address to 1328 Broadway, New York City.

'05. Thomas Fleming, Jr. was elected President of the Associate Alumni of Cornell University at the annual meeting last June. Fleming was a Vice-Presi-

dent last year and has also served for several years on the Cornellian Council.

'06. Rollin D. Wood has changed his address to 5355 Pershing Avenue, St. Louis, Mo.

'07. R. Menees Davis has changed his address to 34 Wyoming Avenue, Hollis, N. Y.

'07. Thomas H. Olds was elected President of the Colorado Section of the American Society of Civil Engineers at the annual meeting on July fifteenth. Olds is a consulting engineer with offices in Denver and was Secretary of the section last year.

Ex-'07. Lawrence J. (Cooney) Rice is with the firm, Sibley, Lindsay and Curr of Rochester, N. Y.

'08. W. Ernest Japhet is Secretary-Treasurer of the Southern Engineering Supply Co., Inc., 98½ Main Street, Houston, Texas. His P. O. Box is No. 735.

'08. George Paaswell had a paper in the May Proceedings of the American Society of Civil Engineers on "Transmission of Pressure through Solids and Soils and the Related Engineering Phenomena".

'08. Emilio Quinsumbing, Designing Engineer of the Irrigation Division of the Bureau of Public Works, Manila, P. I., has received orders from his government to make special investigations and study irrigation and river control problems in British India, Java and other countries.

'08. Major Edward A. Wood, formerly Engineer for the Metropolitan Development Association of the Dallas Chamber of Commerce, was appointed City Plan Engineer for the City of Dallas, Texas, on August first.

Ex-'10. Thomas W. Barnes gives his address as 319 North Michigan Avenue, Chicago, Ill.

'10. Charles J. Rasch is Engineering Examiner on depreciation of Shipbuilding plants for the U. S. Shipping Board. His home address is 2846 Guilford Avenue, Baltimore, Md.

M.C.E. '11. G. Wells Ely has changed his address to 39 Charles Street, New York City.

'11. Samuel A. Graham has returned from Australia and may be addressed in care of Mr. Elwood Knapp, 469 West 152d Street, New York City.

'11. Louis A. Rodenheiser has changed his address to Box 626, Iowa Park, Texas.

Ex-'12. William L. Biggart is with the New York Telephone Company at 15 Dey Street, New York City.

'12. Matt M. Bird has changed his address to 710 Parkview Avenue, Dallas, Texas.

'12. Richard L. Elton gives his address as 5646 Rockhill Avenue, Kansas City, Mo.

'12. Edwin A. MacKrell was married recently to Miss Goldie B. Mardis of Johnstown, Pa.

'12. Charles R. Meissner gives his address as Riverside, Ill.

'12. Abram L. Van Sielen is Assistant to Superintendent, Texas Oil Co., 17 Battery Place, New York City.

'13. Herbert A. R. Austin is Secretary of the Cor-

nell Club of Hawaii. His address is 2346 Liloa Rise, Honolulu, T. H.

'13. Holbert W. Fear is Secretary of the Cornell Club of Fulton County, Gloversville, N. Y.

'13. Samuel Garmczy, Chief Designing Engineer for the Atlantic, Gulf and Pacific Co., Manila, P. I., has been elected an Associate Member of the American Society of Civil Engineers.

'13. Clinton S. Hunt has changed his address to 387 Aberdeen Street, Rochester, N. Y.

'13. Paul L. Maher is an engineer with the Charles E. Bodaux Company, Cleveland, O.

'13. Harvey T. Munn has changed his address to 907 Kahl Building, Davenport, Ia.

'13. F. Barnard O'Connor, Assistant Chief Engineer, Alphon Custodis Chimney Construction Co., was in Ithaca recently on business in connection with the chimney for the new heating plant which this company is building.

M.C.E. '13. Jose Paez, Director of the Bureau of Public Works, Manila, P. I., is President of the Cornell Club of the Philippines and is also acting as secretary during the absence of the regular secretary, Emilio Quinsumbing, C.E. '08.

'13. Theodore C. Schaetzle has changed his address to 37 Ruekert Avenue, Baltimore, Md.

'13 and '17. Albert A. Ward and Ernest W. Kurz have established the firm of Ward and Kurz, Contractors and Builders, Ithaca, N. Y. The new concern has several houses under construction and was the low bidder on the contract for masonry and carpenter work on the new Central School being built by the Board of Education of the City of Ithaca.

'13. Russell D. Welsh has changed his address to 4014 Forest Park, Baltimore, Md.

'15. Charles K. Kerby and Miss Alice L. Franson, Vassar '19, were married on May nineteenth. Kerby is in the real estate and insurance business at 110 William Street, New York City, and resides at 559 East 29th Street, Brooklyn, N. Y.

'16. William L. Havens spent a few hours at Ithaca early in September while on the return trip from his old home at Edmeston, N. Y. to Cleveland, O.

'17. A son was born on June 26th to Mr. and Mrs. Chauncey M. Briggs of Chicago, Ill.

'17. Jacob Fruchtbaum had an article on "Design and Construction of Light-Weight Floor Systems" in the Engineering News-Record for May 4, 1922.

'17. Gabriel E. Lund is Engineer for Fred T. Ley and Co., Inc. on the construction of an apartment hotel in New York City. He may be addressed in care of the above company at 19 West 44th Street.

Ex-'17. Mr. and Mrs. Murray McConnell (Dorothy C. Street A.B. '17) are now living at 626 Bergen Avenue, Jersey City, N. J.

'17. Vincent J. Paeello has changed his address to 115 Smith Street, Port Chester, N. Y.

'18. Robert C. Edmunds is Secretary of the Cornell Club of Akron, Ohio. Mr. and Mrs. Edmunds

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SCHOOL NOTES

TROPHIES WANTED

The record of C.E. in intercollege sports last year is now past history but it may spur us on to renewed efforts to add to the laudable collection of trophies now adorning the walls of the library.

In soccer, basketball, crew and baseball, C.E. teams proved dangerous opponents but didn't quite get the championships which slipped into the hands of other colleges, notably Ag. and M.E. In fact, Ag. and M.E. seem to be taking it for granted that one or the other of them will cop each intercollege trophy.

This year presents to us another excellent opportunity to give the haughty farmer and the proud plumber a jolt. When our athletic manager Duke MacBean calls for team candidates, if you have any interest in the sport at all—try out for the C.E. team. Shingles, which will nicely adorn any bare spots on the walls of your study, are always awarded to members of the various teams. The exhilarating excitement and exercise of the game is only a minor advantage which will work for your personal development and pleasure. Let's step forward this year and knock the hayseed from the farmer, crown the plumbers with a lead pipe, give the rough horse-doctors some of their own medicine in a sugar coated pill, and in general show them that the sewer diggers, as they style us, when they start digging, do a thorough and well-finished job. Lets go, all you C.E.'s.

ROD AND BOB

Spring Elections, 1922

Class of 1924—Edward Buckler Kirby, Charles Milton MacWilliam, Jr., Morris Mead Montgomery, Daniel George O'Shea, Jr., Joseph Anthony Rooney, Lester Bartlett Shapleigh and Philip Allen Wood.

C. E. VARSITY ATHLETES

The class of 1924, school of C.E., gained a unique distinction last spring when three of its members were elected captains of varsity teams. Fred Lovejoy, Moakley's stellar sprinter, was elected captain of the track team; E. B. Kirby, star miler, was chosen to lead the cross country team; and J. A. Rooney, who played center on the LaCrosse team throughout the season, was elected to the captaincy of that team. These men have deservedly won these high honors by strenuous, conscientious and successful efforts. May they be as successful in leading their teams to victory.

Other C.E. men who won berths on varsity teams were Walt Rollo, Fritz Schreiner and Tom Telfer on the baseball team; Huck Bosworth, Bob Schmidt, S. E. Siseo and E. P. Diehl on the LaCrosse team.

DIPLOMACY

It all happened in the Masonry and Foundations class last term. A "creeping like snail, unwillingly to school" student (do you know the type?) was asked a question by Professor Jacoby. After stalling and stuttering for a few minutes the student gave up and allowed Professor Jacoby to answer the question. As soon as Professor Jacoby had finished, says the bright student, he says, "Professor, that's just what I was going to say." Moral: If you want to go through college in an easy way, be diplomatic.

PYRAMID

Spring Elections, 1922

Class of 1924—Elias Florence Buckley, Jonathan Mueller Ball, Hal Robert Davis, Haskell Moisson Thomas, Lewis Newton Thomas, Frederick Conger Wood, Dawson Frank Zaug.

FOOTBALL SCHEDULE

Our varsity football team, unbeaten last year, will line up against the following teams this fall. We hope that not only will last year's record be attained and they will again be victorious in every conflict, but that the chosen opponents will turn out to be foes who are worthy of Gil Dobie's warriors, so that in view of their season's records, victories for us over them will clinch for Cornell, the championship of the East. Certainly we are justified in high hopes with every student, senior, junior, sophomore and freshman backing the team with support—financial and moral and vocal. The schedule for 1922 is as follows:

St. Bonaventure	At Ithaca	September 30
Niagara	At Ithaca	October 7
New Hampshire		
State	At Ithaca	October 14
Colgate	At Ithaca	October 21
Columbia	At Ithaca	November 4
Dartmouth	At New York	November 11
Albright	At Ithaca	November 18
Pennsylvania	At Philadelphia	November 30

A REPLY

In our March, 1922 issue on page 87 (of course you keep the **Civil Engineer** on file and it won't take you an instant to turn to this page) we published an item entitled "Hoss thieves?" in which we gently called one of the foresters to task for posting an item on our bulletin board which ran like this: "Will the gentlemen engineers who removed the drawing boards from Room 16, the Cartography Room, kindly return said boards and so save the owners from the embarrassment of stealing boards from some other class?" What we objected to most in this notice was accusing the Civil Engineers of theft. But the thing that made us real mad and which led us to take up the challenge was the mild sarcasm expressed in these two words, "gentlemen engineers". Strange, what little things will do.

A short time ago we received a reply from our forester friend. He says:

Editor, Cornell Civil Engineer.

Dear Sir:

I was recently somewhat amused and a bit irritated by an editorial in the **Civil Engineer**, commenting on what the writer of the editorial seemed to consider the kiddish and frosh-like, if not actually mean-spirited, attempts of the foresters taking course 214a to find some trace of their drawing boards and other drafting material. As one of seven men who lost boards, I had a personal interest in attempts to trace them; to have such attempts set down as a stingy tendency to deprive men with no boards of their own of a reasonable use of ours, seemed to me unjust. Worse, the boards, which the editorial referred to as "common property" were anything but common to us. We bought them, brought them to Lincoln Hall with us, were absolutely deprived of all use of them, and were obliged to return to our own department without them, even though we had considerable need of them. I intended to write a scathing retort to the editorial in the **Civil Engineer**, but put it off till it would have been inappropriate.

I am now glad that I failed to reply, since it has become evident to me that a reply would have been both unnecessary and unjust, and that the editorial reproof was merited. A year ago last December, on the first day of drafting in course 110, I went out of the room for a few

minutes, and when I returned my T square was missing. I inquired about it that term and the next, to no avail. Naturally I gave up all hope of finding it. Two days ago I received a card saying that it was in the office, and that by calling for it I might get it. I got it, too. The Engineering conscience, while a trifle slow, is sure. Perhaps if I come back for the semicentennial reunion of my class I may get my drawing board. Meanwhile, thanks to your editorial, I know a place where boards grow as common property, and when I really need one I'll come and get it.

Very sincerely yours,

A FORESTER '23

Now is this not a masterpiece? In the first place, Mr. Forester, '23, we object because the item which you refer to in your letter as an editorial was merely an insignificant School Note. Don't for a minute think that the foresters are so important as to take editorial space in the **Civil Engineer**. They're not. We wish to thank you for your "slow but sure" compliment to the engineer. Of all the compliments which have been given civil engineers down through the ages, this one is indeed the rarest. We are very glad that you got your T square. Just stick with us and the board will turn up. And don't write us any more letters. You see, the alumni send us so much mail (mostly checks for subscriptions) that we hate to have our mail box cluttered up.

MUSEUM

The museum is no more,—at least most of it has disappeared and the one remaining section, along the south side west of the door, has been arranged and labeled in accordance with the suggestions in our May issue.

Some of the space thus obtained has been used to enlarge the instrument room and the remainder will give a larger and better lighted and ventilated study room. It is expected that this room will be used by those who do not need books from the library rather than the reading room at the southeast corner of the building, thus relieving the congestion in the latter room.

Many of the models have been placed on shelves in the drafting rooms, those relating to Descriptive Geometry in Room 32 and those relating to Structural Engineering in Room 14. Thus they are made available where these subjects are taught. Other models of historical or educational value have been retained and the remainder have been thrown away. It is believed that these changes will make for a more efficient use of both the models and room.

EMPLOYMENT SERVICE

Charles M. Chuekrow, '11, care of Fred T. Ley Co., Inc., 19 West 44th Street, New York City, is now in charge of employment service for the Cornell Society of Engineers and Director Barnes, '97, is handling the Ithaca end of the work. Both experience the greatest difficulty in finding the men best fitted for the job offered and believe that it would often be possible to put graduates in better positions if they knew more fully the qualifications and desires of the individuals.

Faculty Activities

Busier Than Ever During Vacation Months

Director Barnes '97, spent most of the summer in Ithaca attending to school correspondence and other business, including repairs and changes in Lincoln Hall and at the Fuertes Observatory. One week was spent on a motor trip to his old home in the Berkshires where he and his family visited his mother, his sister, Mrs. W. S. Masters, A.B. '09, his brother, Dr. Louis D. Barnes, '12, and other relatives.

Professor (Emeritus) and Mrs. Jacoby returned to Ithaca on September seventh from their trans-continental trip and left a few days later for a motor trip in Pennsylvania. They report a delightful trip on which they visited many of the National Parks and saw many Cornell Civil Engineers, including Professor Boothroyd who was at the Dominion Astrophysical Observatory at Victoria, B. C.

Professor Ogden, '89, spent most of the summer at his cottage on Cayuga Lake, coming to Ithaca occasionally in connection with improvements at the City Hospital, of which he is a Trustee, and other business. He left Ithaca about the first of September for Portland, Oregon, where he represented the Diocese of Central New York at the meeting of Protestant Episcopal Churches. He returned to Ithaca the twenty-fifth of September.

Professor George, '05, left "Camp" a week early and went to his cottage near Lake Ridge but was called to Ithaca to teach Mechanics in Summer School, it having been found necessary to provide a section in the first terms work. After the summer session he spent some time at his cottage and at his favorite recreation of fishing.

Dr. Schoder, Ph. D., '03, continued work on the data secured by himself and the late Professor Turner on which he has been engaged for the past year. He has also taken charge of the housing of the Fitz Overshot Wheel and other work at the Hydraulic Laboratory.

Captain Dawson, M.C.E., '13, who relieved Dr. Schoder during the first term of last year and who assisted him during the second term, taught Hydraulics in the Summer School and continued work with Dr. Schoder until he left Ithaca on September sixth. Dawson's year at the School was made possible by grants from the Heekseher Research Fund and both students and faculty regret that his stay could not be prolonged. He goes to the University of Kansas as Associate Professor of Hydraulics, taking the place of Jacob O. Jones, M.C.E., '15, who has accepted a position at the University of Minnesota. Mrs. Dawson and John will also be greatly missed in faculty circles, as well as the baby, Murray Heaton, who was born on the twenty-second of June.

Professor Seery has been busy this summer on consulting work for the City of Waterloo and other places and on work in connection with his office as one of the Commissioners of Public Works of the City of Ithaca. The latter work was considerably augmented by the unprecedented floods which visited the city the latter part of August.

Professor Walker, '04, spent most of the summer completing his report on the work he has been engaged on for more than a year for the New York State Milk Conference on the disposal of dairy wastes. However, he has been able to spend a week or two at his cottage on Lake Cayuga.

After returning from "Camp," Professor Conwell '10, spent the summer in Ithaca except for a business trip to Albany the first part of September. This trip and many shorter ones, he made by auto, thus keeping in touch with road conditions and construction over a considerable territory.

Dr. Rettger taught Mechanics in Summer School and afterward obtained considerable recreation at Spence Lake and on a fishing trip to Canada. Assisted by Professors Pond and Seofield, he has also taken care of much of the work of the Committee on Advanced Standing.

Professor Boothroyd left Ithaca soon after returning from "Camp" for Victoria, B. C., where he has spent the summer in spectroscopic work at the Dominion Astrophysical Observatory. On account of the many forest fires observing conditions were very poor at first but improved later due to rains which he described as "not much more than heavy dews".

Professor Carl Crandall, '12, has been very busy all summer with his private practice, part of which was a contract for building roads and paths and grading the extension to the East Lawn Cemetery which he and a local contractor secured early in the summer. Professor Crandall has also been retained by the City of Ithaca to make a detailed survey and map of property rights along a portion of Cascade Creek as a basis for the improvements proposed to prevent further flood damage.

Professor Pond took extended trips by motor to New England both before and after his summer work of teaching Descriptive Geometry.

Professor Urquhart, '09, taught "Concrete" in Summer School and at the time these notes are being written is making a strong bid for the golf championship of Ithaca. A second son, Leonard Church Urquhart, Jr., was born on the ninth of last July to Mr. and Mrs. Urquhart.

Professor Burrows '07, visited his mother at his old home near Binghamton before Summer School, in which he taught Bridges, and again during the early part of September. He also motored extensively through the state.

Shortly after returning from "Camp", Professor Perry went to his old home in Harrisburg, Pa., to join his family which had preceded him there by three or four weeks.

Professors Underwood '07, and Lawrence have spent the summer rather quietly at Ithaca since "Camp" closed. Assisted by Professors Parson and Crandall they have put in some strenuous hours on the schedules and all four are now hoping that the permutations and combinations will work out all right in their applications to activities of actual students.

Professor Weber and family spent the summer with relatives in Indiana.

Mr. Howell, '14, M.C.E. '18, taught Mechanics in Summer School. The Howells visited at his old home in Southampton the early part of September.

Mr. O'Rourke, '17, and family left for his home in New York City as soon as "Camp" was over. "Pat" has been working for the Concrete Steel Co., of which Walter S. Edge, '03, is Chief Engineer, all summer.

Mr. Collum, '21, has also been working for the Concrete Steel Co., but at the Syracuse office, where William S. Reek, '14, is in charge as District Engineer.

Mr. Brown has been very busy building a house on the Ithaca Road this summer. The Browns are now occupying their new home.

Mr. Whitney '22 has been with the New York State Highway Department all summer. He has worked out of the division office at Hornell, mostly on surveys for roads which are scheduled for improvement. He spent a short vacation at his home in Albany just before the university opened.

Messrs. Williams and Chobot, '21, have resigned their positions as Instructors, the former to enter the U. S. Air Service and the latter to accept a position with The Phoenix Utility Co., of which Warren E. Day, '10, is General Superintendent, at Albemarle, N. C. Williams was in Texas part of the summer but later returned to Washington, D. C. Chobot was in Ithaca most of the summer after "Camp" was over but left for his new position about the first of September.

Professor Frank Theroux, of Valparaiso University, will be an Instructor in the Railroad Department during the ensuing year. He will take up graduate work and expects to spend at least two years at Cornell.

Mr. Lowell J. Chawner, who was in the Graduate School last year, will assist Professor Ogden as Instructor in Technical Writing this year.

Mr. Dwight L. Copeland, '23, has been appointed Instructor in Surveying for the ensuing year.

PROMOTIONS

Late last spring, at one of the last meetings of the Board of Trustees the following promotions were authorized in the Faculty of the School of Civil Engineering:

Ernest W. Rettger, promoted from Assistant Professor to Professor of Applied Mechanics.

Charles L. Walker, promoted from Assistant Professor to Professor of Sanitary Engineering.

Herbert H. Schofield, promoted from Assistant Professor to Professor of Materials of Construction.

Paul H. Underwood, promoted from Assistant Professor to Professor of Topographic and Geodetic Surveying.

S. P. E. E.

The Society for the Promotion of Engineering Education accepted the invitation conveyed to the Annual Convention at the University of Illinois last June by Cornell's delegate, Professor W. N. Barnard, of the Sibley School of Mechanical Engineering, and will hold its convention next June at Cornell. The convention will probably be held just after Commencement and already plans are under way for making this meeting a real success. We hope all Cornell engineers who are interested in engineering education will assist by suggestions and by attending the convention. More practicing engineers should be members of this organization for the advancement of engineering teaching and we urge those interested to send to Dean F. L. Bishop, University of Pittsburgh, for application blanks.

WINTER IS HERE

Professor Crandall let another one of his jokes slip. Several men in railroads were huddled together doing earthwork computations. Upon entering the room, Professor Crandall noticed the wide open windows and the men huddling together and remarked "Must be cold in here."

HINCKLEY RESERVOIR OPERATION

(Continued from page 8)

precipitation, yet we feel that it would be very difficult to devise any scheme which would enable us to make better use of the stream flow than that provided for by the Regulation Diagram."

Future Developments

If future records covering a period of years indicate natural inflows materially differing from those used in this study, or if additional storage of an appreciable amount is built above the Hinckley reservoir, which can be operated in conjunction with the Hinckley reservoir, thus giving the equivalent of one larger reservoir, it would be advisable to consider a modification of the operating diagram.

In Memoriam

(Continued from page 10)

Aide in charge of the inspection force on the 1000 foot drydock No. 3 at that Yard.

His death was due to influenza contracted while doing final special work in the tunnels of the dry dock which required his constant attention. Martin was married on June 8, 1907 to Miss Daisy M. Prutzman, of Duryea, Pa., who survives him together with five children, Elizabeth, Sarah, Dorothy, George and Lucy. He was a mason and his quiet efficiency and kind character will be long remembered by all who knew him.

Gerardus Harrisson, C.E., 1910.

Gerardus Harrisson died on July twenty-fourth at his home at Larchmont Gardens, Larchmont, New York.

Harrisson was born on May thirty-first, 1888, at Brooklyn, New York, and entered Cornell from the Boys High School of that city in 1906. Receiving his degree of Civil Engineer in 1910, he entered the employ of the American Bridge Company as Draftsman, spending nine months at the Pencoyd plant and eleven at the plant at Brooklyn, N. Y.

For the following three years, February 1912 to March 1915, he was Engineer for Henry Goldmark, Consulting Engineer, of New York City, in connection with the construction of a plant for the Canadian Locomotive Company, Ltd., at Kingston, Ontario. For the last year and a half he had charge of all designing and was Chief Field Engineer on this work.

From March 1915 to January 1916, he was Secretary and later Vice-President of Percival Robert Moses and Associates, Consulting Engineers, New York City, and was in charge of their civil engineering work. During this period he also assisted Henry Goldmark on the design of the Jinsen Dock, Chemulpo, Korea, and Charles J. Goldmark in constructing and equipping a munitions plant for the Canadian Locomotive Works.

From January 1916 for two years he was associate member of the firm of Henry and C. J. Goldmark, Consulting Engineers, working until August 1916 on further extensions to the plant of the Canadian Locomotive Works. The remainder of the time he was in full charge of the design and construction of plant and power extensions for the Lima (Ohio) Locomotive Works.

In January, 1918, Harrisson was made a member of the firm and continued in charge of the Lima Works and later had full charge of the Bucyrus plant, the Springfield plant of the Ohio Steel Foundry Co., and other important work. This connection continued until the date of his death and his many friends and associates will mourn that such a promising career has been terminated so early.

Harrisson was a member of the Banjo Club while in the university and was an Associate Member of the American Society of Civil Engineers.

BETTER LIGHTING NEEDED IN INDUSTRIAL PLANTS.

In a paper read before the Illuminating Engineering Society, February, 1920, entitled, "A Survey of Industrial Lighting in Fifteen States," R. O. Eastman submitted some very interesting data regarding the lighting conditions in industrial institutions. The survey comprises some 446 institutions, in which lighting was considered by 55.4% as being vitally important, and by 31.6% as being moderately important, and by 13% as being of little importance. Practically 58% considered that lighting was as important as power in the operation of the plant, and a small proportion would give more attention to lighting than to anything else.

In considering the present condition of lighting as found in the various plants, only 9% ranked as excellent, about 1/3 ranked as good, 29% fair, 18.8% poor, 3.5% very poor, and 7.8% partly good and partly poor. It was found that the lighting in the offices was far superior to that in the shops; 19% being excellent, 36% good, 31% fair, and only 13% poor and none very poor.

On consulting the executives regarding what factors were most important in considering lighting, the following facts were revealed: Increase of production 79.4%, decrease of spoilage 71.1%, prevention of accidents 59.5%, improvement of good discipline 51.2%, and improvement of hygienic conditions 41.4%. Manufacturers who have good lighting appreciated its value largely from the standpoint of its stimulating effect upon output.

There is no question that any intelligent man who carefully considers the necessity for good lighting in an industrial plant, will agree that it is impossible for a person to do as good work, either in quality or quantity, in poor light as in good light, but yet the result of a careful analysis discloses the fact that only about 40% of industrial plants are furnishing good light to their workers and 60% are operating under poor lighting. It is hard to understand why such a proportion of concerns can be satisfied with a condition which is universally admitted to be a curtailer of efficiency and a prolific causer of accidents. The principal cause of this condition is that those in charge of such establishments have not given the attention to lighting that it demands. They do not know what constitutes good lighting, and in their absorbing interest of other factors of production have overlooked a vital one.

Every safety official should deeply interest himself in the lighting of his plant and insist upon good lighting as much as good goggles, good guards and other necessary accident prevention equipment. Every production manager should insist upon good lighting because the efficiency of the working force is increased by the condition of the lighting furnished. The plant physician should examine the lighting, for eye strain and eye fatigue are directly affected by poor lighting, as is the hygienic condition. Well lighted plants are invariably cleaner than poor lighted places. Plants equipped with Factrolite Glass in all windows are well lighted.

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REPORT OF 1922 CAMP

(Continued from page 9)

motor on the new rowboat was working well and Professor Lawrence was able to continue his sounding by towing the big boat. However, the inability to put men on the triangulation stations on the opposite shore seriously hindered work.

During the second week at camp several heavy rains threatened to put a stop to all work. The clay of the camp-site turned to a sloppy mush and the uncertainty and suddenness of the storms caused every one to return to camp thoroughly wet. A serious washout occurred on the Lehigh Railroad which held up the mail from Ithaca several days. The good weather of the rest of the camp period partially made up for the wet weather and by the first of July many of the parties had completed all their traverses and had started work on the maps.

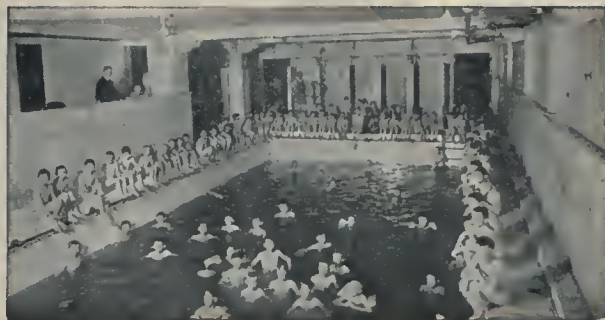
For Sunday, July 2, a baseball game was scheduled between the camp and Aurora village. The camp turned out in a body but found no one to play against because the Aurora team considered the field too wet to play on. Rather than go back we picked two teams from the camp and played a good game. Buckley, making a home run, got stuck in the mud off third base and was only able to get out by pulling his foot out of his shoe. Aleus on first played well, making some double and some bonehead plays. Again on the Fourth of July a game of ball was played. This time the camp lined up with Scipioville against Kings Ferry and played at the Poplar Ridge celebration. We lost by one run in spite of our pinch hitters, Shimmy and Cassidy, but we won the rest of the celebration and went back to camp with a good assortment of axle grease, shoes, trousers and oil.

The following day the plane tables were brought forth and the maps took on a more grimy color from then on. Triangulation and Hydrography proceeded rather slowly due to the broken boat engine, but the leveling work went on well in spite of the ridiculous blunders, such as that of our party which argued for an hour that levels could not be run up hill, and which walked all the way to the other end of the line in order to run the level down hill. By this time most of the star azimuth observations had been taken, but this was found to be the smallest part of the work of figuring latitudes, for many hours were spent computing and when that was done many more hours were used to hunt up some little mistake. Friday night of this, the fourth week, saw much rapid work done on the short-time parties' maps and enviously we watched them leave camp Saturday.

Luckily, the weather of the fifth and last week was ideal and we made the most of it; so that by Friday noon a party had its map done and but few parties had to work the last night.

Saturday morning we broke camp with a speed

(Continued on next page)

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and efficiency that would have been a credit to a circus troupe. The camp was awakened at five o'clock by "Spike" Pendleton clattering his wash-basins like a whole party of Snipe hunters. Sweet milk for breakfast put everyone in a good humor and by ten o'clock the field was as clean as a whistle. A few of the men stayed up to stow equipment in Aurora while the rest took the eleven o'clock train to Ithaca. The trucks brought the tents to Lincoln Hall and after three hours of the hardest kind of labor they were all hoisted and stowed in the attic of Lincoln and we breathed a genuine sigh of relief.

ALUMNI NOTES

(Continued from page 12)

and son visited Mrs. Edmunds' mother, Mrs. R. S. Tarr, at Ithaca during September.

'18. Frank V. D. Fields, formerly Editor-in-Chief of the CORNELL CIVIL ENGINEER, is Resident Engineer for the Florida State Highway Commission at Callahan, Florida.

'19. Charles J. Howell was married on August seventh to Miss Helene Margaret Cameron at Pittsburgh, Pa.

'19. '22. Thomas C. McDermott and Miss Anne Morrow, B.S. '17, were married on June fourteenth at the Alpha Omicron Pi House, The Knoll.

Ex-'19. Ross L. Milliman is a special agent in the

Compensation and Liability Department of the Travelers Insurance Co. His address is 906-9 Great Southern Building, Dallas, Texas.

'19. Osear J. Sewell was married on July twenty-second at Memphis, Tenn., to Miss Lois Marie Parke, daughter of Mr. and Mrs. Ernest Grant Parke. Mr. and Mrs. Sewell are at home at 119 McCann Street, Benton, Ill.

'20. Charles M. Cormack was married on June first, 1921 to Miss Vilma Vigert, B.S. '19. Mr. and Mrs. Cormack are living at 435 Massachusetts Ave., Buffalo, N. Y.

'20. A son, Donald Gordon, was born on May 28 to Mr. and Mrs. Gordon MacKellar, of Wilkes Barre, Pa.

'20. Harold I. MacKen spent part of his vacation during August looking up old friends in Ithaca.

'20. Charles E. J. Modjeski was married on June seventeenth to Miss Ruth L. Phinney '18, of Ithaca, N. Y., at the home of the bride's sister in Lexington, Ky.

'20. Alger J. Smith is a draftsman with the American Bridge Company at Elmira, N. Y. Smith was married last year and has a son three or four months old. He resides at 1010 Lincoln Avenue, Elmira, N. Y.

Ex-'21. Lorraine W. Carter is with the Fiske-Carter Construction Co., Spruce Pine, N. C.

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Vol XXXI

NOVEMBER, 1922

No. 2



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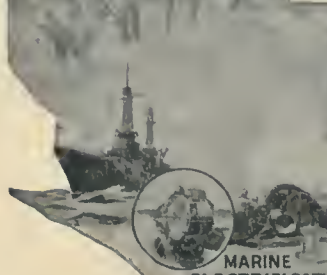
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NOVEMBER, 1922

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Campus Construction	18	School Notes	21
A brief account of the tremendous amount of construction work going on around the Campus.		Including C. E. Registration Figures, Inter-College Athletics, Reports of the Student Chapter, A. S. C. E., and other notes of general interests and activities.	
Stresses in a Roof Truss, by Arthur W. Engel, C. E. '09	19	Alumni Notes	24
A description of the solution of a new steel mill building problem.			

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Vol. XXXI

NOVEMBER, 1922

No. 2

EDITORIALS

ANNOUNCEMENT

The **Cornell Civil Engineer** takes pleasure in announcing the election of Professor S. G. George '05 as a member of the Faculty Advisory Board.

REPRESENTATION

There has been some rumor going on around the north end of the Campus to the effect that the Sibley Journal of Engineering is the only student publication representing the Cornell University College of Engineering. We take this means of calling to your attention that while the Sibley Journal of Engineering is a very good representative of the School of Mechanical Engineering, it fails to cover the field of Civil Engineering and, consequently, cannot be a fully representative publication of the College of Engineering. The **Cornell Civil Engineer** claims part of the honor of representing the College of Engineering as the student publication of the School of Civil Engineering, and will continue to uphold and cherish this honor as it has done during the past twenty-eight years.

COLLEGE ATHLETICS

The value of college athletics is two fold. First the physical benefit to the individual resulting from regular exercise each day, and second the college spirit developed by snappy athletic competition.

The first of these has received so much attention that anything additional may appear as mere repetition, but the subject is so important to us all that we feel too much cannot be said about it.

As a rule the college man spends a good portion of his time at his desk. Living this sort of life for several years, he forms the habit of neglecting the betterment of himself physically. This neglect of his body while in college will cause serious complications in later years. This should be kept in mind because an engineer, above all professional men must be physically fit to surmount obstacles with which he is sure to come in contact.

Some men have not the physical qualifications of a Varsity athlete, while others do not have the necessary time. For such men as these, college athletics

are primarily intended. Practice begins after classes are over. All games are played late in the afternoon or in the evening. An hour of snappy exercise followed by a cold shower puts the necessary pep into a fellow for another day's work. These are advantages and benefits which pay huge dividends as the years go by.

It is our opinion that the entire morale of the college is directly affected by the spirit which individuals display. It is easy for all of us to be "ring siders" and cheer lustily when the time comes. However the cheer means much more if we have a self-satisfied realization that our team was improved because of our contesting for one of its positions. We can be thankful that we helped develop the good men into better men, and to put a team in the field which did not carry the small end of the score continually.

How many heard Prof. "Howie" Seofield, faculty athletic adviser, speak up at the first meeting of the Student Chapter of the A. S. C. E. meeting on Monday night, October 2? He outlined three plans as possible methods of procedure for the C. E. athletic policy of the coming year:

1. Continue our present indefinite policy.
2. Consolidate with Sibley.
3. Institute the "ideal" policy.

New men, you will not be here long before you absorb our thirst for advancement, and when you do, you will understand the reason why number one quickly hits the discard chute. Another thing of which we are justly proud is our individuality, consequently number two is not far behind number one. But that little word 'ideal' in number three saves the day, for with number three we can do anything. Our limited number need not handicap us in the least. We have more men engaged in Varsity activities, in proportion to our number, than any other college on the campus. That is the sort of spirit that will overcome our handicap of numbers in college athletics.

Don't wait—get in it now or the time will be harder to find later. Let's bring back a few penants to Lincoln Hall this year.



SIDE VIEW OF NEW CHEMISTRY BUILDING NEARING COMPLETION

Campus Construction

Construction projects, totalling more than three million dollars in value are, at present, under construction by the University, representing the largest building boom, in this vicinity, in recent years.

The new Chemistry Laboratory, the cornerstone of which was laid October 21, 1921 by George F. Baker, the donor of the building, is the most costly addition to the campus in many years. The construction is progressing satisfactorily, the contract calling for its completion by the Fred T. Ley Co., Contractors, by July 1, 1923.

Dairy Building to Ag. College

The third largest construction job now under operation on the Campus is the new Dairy Building, located at the extreme east end of the quadrangle of the College of Agriculture. The new edifice represents the first unit of the \$3,000,000 building project of the State College, to which the State of New York has appropriated approximately \$500,000. This building will provide better quarters for the Dairy Department, which has heretofore been located in a wing of Roberts Hall.

The fifth unit of the University residential group, namely Boldt Hall, is well under way. The building will face University avenue, and adjoin North Baker Hall and Baker Tower. Ground floor work stands practically completed and according to contract, the building will be ready for use by February 1923.

Winter Sports House

The new Winter Sports Club House, located directly north of the dam at the west end of Beebe Lake, is another notable addition to the family of buildings on the campus. The work of construction is in charge of the Athletic Association, and will be ready by Nov. 1.

The building combines all the features of a club house with warming rooms, lockers, and an all-year-round tea room. It is the hope of the Association that the proceeds of the tea room will pay for the cost of the building in ten years. The building will be open to all members of the Minor Sports Association.



BOLDT HALL, THE NEW DORMITORY UNIT

tion, and will have its official opening at the close of the Christmas holidays.

New Heating Plant

The new central heating plant, located on a spur of the Lehigh Valley tracks, just north of the East Ithaca station, is being rapidly pushed to completion, and it is expected that it will be in operation at least a part of the winter.

This new plant, will provide heat for all the Uni-

(Continued on page 20)

Stresses in a Roof Truss

A Solution of a New Problem

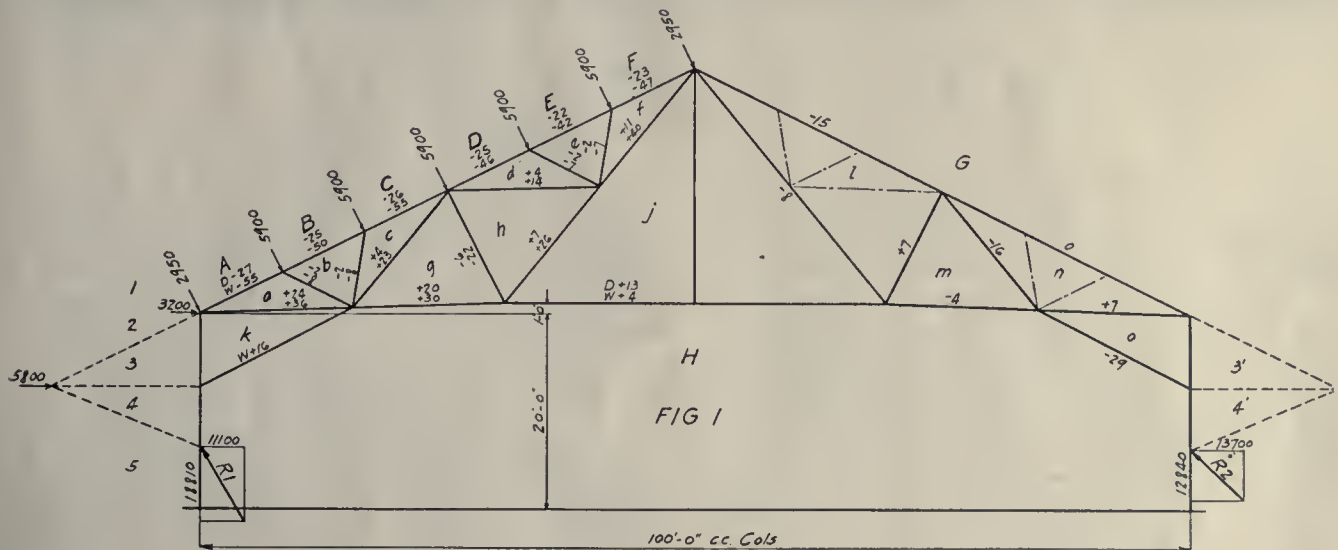
By ARTHUR W. ENGEL C. E. '09
Designer, American Bridge Company

The problem is to find the stresses in a truss for a mill building located where there are very heavy winds and no snow. The wind load assumed is 40 pounds per square foot when blowing against a vertical surface. By the Duchemin Formula this gives 30 pounds per square foot acting normally to the roof, which has a slope of six inches in one foot.

The dead load, which includes structural steel

figure two, we begin at the point of contra-flexure of the left hand column and continue the stress diagram taking members counter-clockwise. At the fourth panel point of the top chords we encounter three unknown stresses, but this can be solved easily by computing the stress in **Hj** taking moments about the peak of the truss and then finding the stress in **hg** graphically in the stress diagram.

The members shown by dot and dash lines have no



and corrugated steel roofing, is assumed to be 12 pounds per square foot of horizontal projection of roof and the trusses are spaced 21 feet center to center. The bottom chord is broken so that no computations need be made in the drawing room or shop for camber and the bottom chord bracing angles can be turned with legs down if desired without reducing the clearance.

The columns are to be "fixed" at the base and the point of contra-flexure is taken at a point half-way between the floor level and the knee brace. Auxiliary members are introduced as shown dotted in figure one that the problem may be solved graphically.

The dead load amounts to 2100 pounds per panel point of top chord. The dead load stresses are given above the wind load stresses.

The reactions due to wind are found analytically. It is assumed that the horizontal thrust is divided equally between two columns. The horizontal component of R1 is reduced by a direct wind load from the left amounting to 2600 pounds. The vertical component of R1 is found by taking moments about the point of contra-flexure of the right hand column.

After plotting the loads and reactions as shown in stress due to wind when the wind is blowing from the left.

When the auxiliary members are removed, the stresses in the columns must be revised as the stress in the section below the knee brace, is equal to the

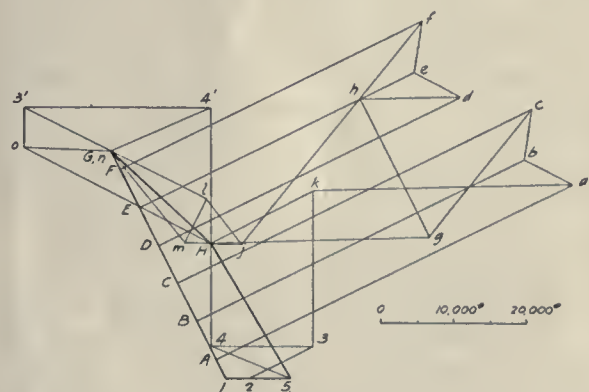
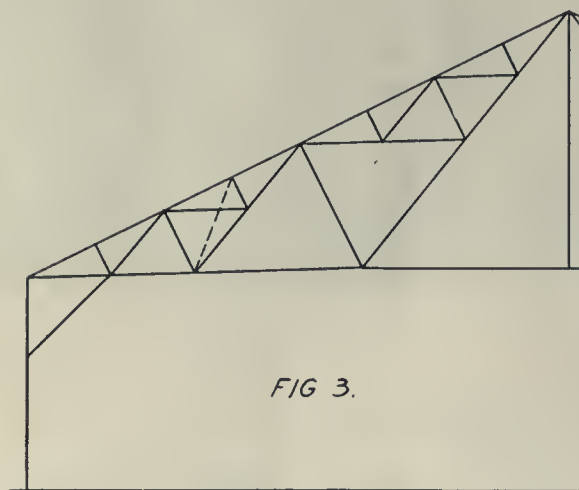


FIG 2.

diagram for the joint at foot of knee brace will not close as there is bending in the column at that point. vertical component of the reaction and the stress

If the truss is changed to type shown in **figure three**, an auxiliary member must be introduced as shown by dotted line or the stress in third panel of the bottom chord can be found analytically to overcome the difficulty when three unknowns are encountered at a joint. In this type of truss the slope of the knee brace will cause the stresses in the bottom



and top chords to increase, for in the diagram if **Hk** becomes steeper, **ka** and **Aa** increase in length.

In proportioning the members those having a reversal of stress should be made sufficiently strong to carry the maximum stress plus one-half the minimum, provided no member has less section than required by either the tension or the compression stress acting alone.

The rivet connections should be made of sufficient strength to take the sum of the stresses.

CAMPUS CONSTRUCTION

(Continued from page 18)

versity buildings, including those in the College of Agriculture, Prudence Risley, Cascadilla, and the mens residential halls. It has been estimated that the new heating unit will pay for itself in 20 years, as a large sum of money will now be saved each year on the hauling of coal.

Down town the Treman, King and Co. Building, just completed at the corner of State and Cayuga Streets, is one of the finest buildings in Ithaca. The four-story fireproof building was finished in record time and is now being occupied by the retail store and by the officers of the company.

Among the other large construction projects that are either now under way or planned for the near future in and around Ithaca, the building of a new block for the Ithaca Savings Bank to replace the one partially destroyed by fire is probably the most ambitious. The Savings Bank has leased the corner now occupied by the Corner Bookstore for two years, beginning January 1, 1923, as temporary quarters until the new building is completed. The new Masonic Temple, which has been under consideration

by Ithaca Masons for some time, will also take material shape shortly, following the acquisition of the Hoysradt property on the southeast corner of Seneca and Cayuga Streets for building purposes.

SCHOOL NOTES

PUBLICITY—AN ACTUAL INCIDENT

Last June a senior was approached by our circulation manager with the request, "Sign up for the CIVIL ENGINEER now and keep in touch with Lincoln Hall during your first year out in the engineering world". The sum and substance of the senior's reply was as follows: "No siree, you don't catch me signin' up for no CIVIL ENGINEER. (The grammar is his) I'm not goin' to have ya printin' when I get married and when my babies are born. That's nobody elses business but my own." Our circulation manager tried to show the senior the advantages of being one of our subscribers but to no avail.

Not twenty-four hours later, this same senior who happened to be deeply interested in bridges took the trouble to walk up to the fourth floor of Lincoln Hall to our office and asked, "When is Blank's thesis on 'Stresses' going to be published in the CIVIL ENGINEER? I want to be sure and get a copy." What should be done, dear reader, with such people?

C. E. REGISTRATION

The registration figures, as given by the office of the College of Civil Engineering, show a decrease of about twenty over last year's C. E. registration. The enrollment is as follows:

1926 (with part sophomore credit)....	4
1925	74
1924	69
1923	81

Total 228

Last year there were about two hundred and fifty civil engineering students. (The above figures refer only to the sophomore, junior, and senior classes.) Eighty-four freshmen of the class of 1926 have elected C. E.

The total enrollment in the entire university this year is 5188, including the medical college in New York. The total number registered in engineering is 1347.

CROSS COUNTRY

The annual intercollege cross country run will be staged the last of November. The definite date is not fixed but it is probable that it will be that on which the intercollegiates are held, November 27. C. E.s who are out for cross country, or can run, should keep the date in mind and be in the pink of condition for the race. Freshmen and those not on the varsity are eligible. The winning team will be awarded a trophy, and the first four men to cross the finish line will be given medals.



SCHOOL NOTES

STUDENT CHAPTER, A. S. C. E.

The student branch of the A. S. C. E. has already held its first meeting. If you were not at the first meeting be sure to be at the next. Why? Well, why have a good time while at college? Why get acquainted with C. E. students? Why know the Professors? Why listen to music or eat or drink?

The first meeting of the year, held on October 2 at the Sibley Dog, was opened by President F. E. Spurney with a short business meeting. It was decided that in the future a meeting of the chapter will occur the first Monday evening of each month at the Sibley Dog. Every member of the chapter, and this includes all students registered in C. E., is expected to attend.

Construction Engineers to Speak

At the present time plans are being made to secure some prominent engineer to give a short talk at each of the meetings.

After the business session Director Barnes spoke on the present status of Civil Engineering in the country. Prof. Schofield, who is the faculty athletic adviser of the college, made some caustic comments on C. E. college athletics. Then N. H. Khoury, grad. of the Georgia Tech., introduced some songs and stories of the sunny south.

Watch out for the next meeting on Monday evening, Nov 6. Freshmen who expect to take up C. E. next year are cordially invited to attend. Two seniors, W. O. James and E. N. Scott, will each give a short talk. There will be stunts, and a talk by some prominent construction engineer, engaged in work on the campus.—All on November 6.

ROD AND BOB

B. D. Adams '23, G. E. Harrison '23, M. C. Newton '24, C. J. Schmauss '24, K. Shimizu '24.

TAX

The purposes and results of the tax collection of last month will be interesting to all. Those who paid will be interested to know what is done with the money, and those who did not pay will be interested to know they still have a chance to pay up. The tax covers both terms, so no other will be solicited for next term. The tax committee, under B. H. Palmer, chairman, consisted of 7 men from each class; from the class of '23; H. P. Bosworth, H. V. Bonsal, E. P. Diehl, M. J. Hourigan, F. V. Mitchell, G. J. Oehrlein, L. P. Post. From '24; J. M. Ball, P. F. Beaver, C. M. MacWilliam, H. W. Nesch, K. Shimizu, R. T. Spragne, L. A. Tompkins. From '25; W. W. Buckley, L. R. Curtis, B. R. Edstrom, K. F. Hoyt, D. C. Kline, E. B. Ramsburg, J. R. Richter.

The total collection to date is about 70 dollars from '23, 50 from '24, and 40 from '26, which makes a total of 160 dollars. This money will be used to wipe out the deficit of last year's banquet, to buy shingles and athletic equipment for the college teams, to provide eats for the meetings, and pay the rental on the Sibley piano, also to pay the dues to the A. S. C. E. It is not expected that anyone who has failed to pay his tax, and thereby his share of the dues to the A. S. C. E. will place his order for the insignia of A. S. C. E. If there are any men who were not approached by their tax collector, and wish to clear up the debt they can do so by leaving the dollar with Miss Lyueh in the office.

The insignia, a red and white shield, costs a dollar in itself and may be obtained by placing an order with M. J. Grogan, secretary of the chapter.

PYRAMID

H. A. Falconer '24, L. A. Tompkins '24.

FIELD NOTES

As is the custom during each fall term

The Sophomores are just entering the intricacies of the "extreme simplicity" of Mechanics.

The Juniors are enjoying railroading on Cayuga Heights.

The Seniors are taking their ease.

The soccer team has been twice defeated in two games.

At a recent meeting of the Major Sports Council the baseball "C" was awarded to W. R. Rollo, '23, and T. Telfer '23 of the school of C. E. H. P. Bosworth '23 was awarded the LaCrosse "C".

The Sphinx Head showed its wisdom by the choice of H. P. Bosworth and T. Telfer.

RESULTS OF INTER-COLLEGE SPORTS, 1921-22

College	Cross Country	Soccer	Basket Ball	Indoor Meet	Track	Crew	Base Ball	Total
1. M. E.	5	5	10	7	10	4	10	51
2. Agr.	10	7	4	2	5	10	4	42
3. C. E.	3	3	5	10	3	5	3	37
4. Arts.	7	2	7	4	7	3	6	36
5. Chem.	4	10	4	1	4	7	2	32
6. Vet.	1	4	2	0	0	0	6	13
7. Arch.	0	0	0	6	2	0	$\frac{1}{2}$	$8\frac{1}{2}$
8. Law	0	0	2	0	0	0	0	2

Points are recorded as follows:

First	10
Second	7
Third	5
Fourth	4
Fifth	3
Sixth	2
Seventh	1

The showing of the athletes of the School of C. E. during the past year, 1921-22 is very commendable, especially considering the relatively small number of C. E. Students as compared with the registration of other colleges in the university. But this year the record must be greatly improved. The showing of the civil engineers, could be greatly improved if more of the students would take a greater interest in inter-college sports. In fact quite frequently, difficulty was experienced in getting a sufficient number to form a representative team. Inter-college athletics have been organized as a means of exercise for those who do not engage in varsity competition either because of lack of ability, or because of lack of time. For this reason, there is little or no difficulty experienced by those who come out, in making the various teams. You don't have to be an expert at the game to make an inter-college team. If you don't know a game, come out and learn. Let's see if C. E. can't finish on top of the inter-college league in 1922-23.

SOCCER

Soccer, the first sport of the year on the intercollegiate schedule, brought forth fifteen or twenty C. E. candidates, mostly inexperienced. With no chance to practice together they were unfortunately pitted in the first games against the two most formidable teams in the league, Ag. and Vet.

The first game, played on Alumni Field, was

against a powerful combination of Ag. men. But though the C. E. team was green it nevertheless put up a hard fight and only lost by a single score resulting from a foul goal. The personnel of the team was Goal—Norris, Left Fullback—Crounch, Right Halfback—Swindells, Center Halfback—Kwonk, Left Halfback—Rumsey, Center Forward—Buenano, Outside Right—Chan, Inside Right—Bonyun, Inside Left—Bevaqua, Outside Left—Thompson.

The second game against Vet. was not so closely contested and the team lost by the score of 2 to 0.

The easiest games of the schedule remains embracing contests with Chem., Arts, M. E., and Law.

BASKETBALL

Of all intercollegiate sports basketball brings forth the best contests and the best playing. Probably this is due to the fact that it is easier to weld a team from five men than from eleven or nine, required for soccer and baseball.

Last years C. E. team was one of the best in the league, but only one man of the quintet is available this season. Consequently there are four berths to fill. Ortner says that basketball practice for the college teams will commence about the middle of the month. And the first game of the intercollegiate league will occur about the 7 of December.

With the dearth of last years players every one who comes out for practice has an equal chance of making the team. There are good basketball players in the college who, for one reason or another, could not play on the team last year and it will be appreciated if all these men will try out this year. Freshmen and "Pro" men are eligible. Watch the bulletin board on the first floor of Lincoln for announcements.

STUDENT COUNCIL ELECTIONS

It would seem that this year the C. E. College is to get its full share, (and perhaps a little more), of representation on the Student Council, judging by the results of the election on Oct. 26.

Those who are twice blessed by being Civil Engineers and at the same time members of the Student Council are:

Senior Representatives, Benjamin H. Palmer, Jr., '23 and Walter R. Rollo, '23.

Junior Representatives, Edward B. Kirby, '24 and Fred K. Lovejoy, '24.

BACK NUMBERS AVAILABLE

For a short time we will be able to supply single copies and complete unbound volumes of THE CORNELL CIVIL ENGINEER for nearly every year since the beginning of publication in 1893. These volumes are offered at greatly reduced rates. Apply to the Circulation Manager, Cornell Civil Engineer, Lincoln Hall, Ithaca, N. Y. for quotations.

In Memoriam

Charles W. Wasson '74

Charles Willard Wasson succumbed to diabetes at his home in Friendship, N. Y., on July 25. He had been in poor health for some time, but had remained active until a few days before his death.

Mr. Wasson was born in Cuba, N. Y., on October 24, 1846, to Jediel and Lucina Strong Wasson. He spent his boyhood in Friendship, to which place the family moved when he was five years old. At the age of twenty-one, he entered Cornell with a competitive examination scholarship. In 1874, he was graduated with the degree of B. C. E. He immediately took up the profession of teaching and soon rose to county superintendent of schools. Later, he became principal of the grade school in Port Allegany, Pa., where he stayed for a number of years. In 1886, Mr. Wasson married, and soon after, went to Lockport, N. Y., to be superintendent of city schools. He held this position for three years and then became township superintendent of the largest Indian industrial and training school on the Pacific Coast. Mr. Wasson was also State excise commissioner from 1902 to 1911.

While teaching in Portville, N. Y., he became acquainted with the founder of the Chautauqua System, Bishop Vincent, and was engaged to lecture at Chautauqua on industrial education. He introduced this branch of school work and was considered an authority on it.

Mr. and Mrs. Wasson had resided in Friendship since 1901, but passed a great deal of their time in Cuba, N. Y., where Mr. Wasson was head of the Wasson Stanchion Works.

Frank E. Bissell '79

Frank Edward Bissell died on February 25 at his home, 10515 Wilbur Ave., Cleveland, Ohio.

Mr. Bissell entered Cornell in 1874, and became a brilliant student, being elected to Sigma Xi upon its organization. He was also secretary of the Whist Club. He received the degree of B. C. E. in 1878 and that of C. E. in 1879. After graduation, he served with the U. S. Army Engineers for a short time. From 1880 to 1882, he was a draftsman and chief draftsman with the Gould System, building roads in Texas. In 1883-5, he was resident engineer in Kansas with the M. K. and T. Railway. In 1886-8 he was connected with the Fort Worth and D. C. Railway, first as resident engineer in Texas and then as chief engineer of construction. For the following year, he was chief engineer and superintendent of the D. T. and Fort Worth Railway in Colorado. The following year, he was superintendent of the New Mexico Division of the Union Pacific. Leaving rail-

roading for a time, he became treasurer of the T. M. Bissell Plow Company of South Bend, Ind., and in the following year was superintendent of the Fort Worth Iron Works. In 1895, he returned to railroad work as chief engineer of construction for the U. P. D. and G. Railroad and subsequently held the following positions: resident engineer of the Fort Worth and D. C. Railway, 1896; chief engineer of the W. and L. E. Railway, Cleveland, 1897-9; chief engineer of the Arkansas Nor. Railway, 1900; first assistant engineer of construction, L. S. & M. S. Railway, 1901-7; consulting engineer and general superintendent, A. C. & Y. Railway, 1910-13; member Interstate Commerce Commission, 1917 to 1921; chief engineer with a contracting company, 1921 until his death. He was also connected as senior civil engineer with the Bureau of Valuation of American Railroads.

He was a member of the American Society of Civil Engineers, the American Railway Engineering Association, the Cleveland Engineering Society (of which he was also director), the Cornell Society of Civil Engineers, and the Cleveland Athletic Club. He was a 32nd degree Scottish Rite Mason Templar, and Shriner. He had made contributions to the Publications of the American Railway Engineering Association and the Cornell Civil Engineer.

In 1886, he married Ida Mayer Smith, in Detroit. One son, Howard Mayer, born in 1888, lives in Cleveland.

Willard Beahan, his roommate in college and life-long friend, says of him: "His mind was clear, incisive, and tireless. He has left behind him much engineering of importance which is lasting. He was honest. He spent large sums of money for both the Gould and Vanderbilt interests, and did it ever above suspicion. He was capable, reliable, and relentless to his duties. He made friends. He made enemies among the insincere. He was no diplomat. But like the French Knight, the Chevalier Bayard, he was "sans peur et sans reproche."

Harold B. Stevens '02

Harold Burr Stevens died in the Uniontown, Pa., Hospital on January 22, 1922, following an operation.

Stevens was born on March 22, 1879, to Mr. and Mrs. E. L. Stevens, of Rome, N. Y. He prepared at Rome Free Academy and entered Cornell in 1898, being graduated with the degree of C. E. in 1902. He was a member of Psi Upsilon.

He had been employed as a draftsman in the office of Hogg and Porter, civil and mining engineers of Uniontown, Pa., and had also been engaged in engineering work with the H. C. Frick Company and the Carnegie Steel Company of Clairton, Pa.

ALUMNI NOTES

'78. Professor Charles D. Marx, Past President of the American Society of Civil Engineers, spoke on the Social and Economic Aspects of Hydro-Electric Power at the Informal Dinner and Smoker, concluding the Fall Meeting of the Society in San Francisco.

'93. Herman M. Freeman, of Freeman and Winston, Civil and Consulting Engineers, West Orange, N. J., has been elected an Associate Member of the American Society of Civil Engineers.

'97. Elroy T. Agate is with the New York State Highway Department at the Division Office in Hornell, N. Y.

'99. Harry W. Dennis, Constructing Engineer, Southern California Edison Company, is joint author with H. A. Barre of a paper on the Growth and the Uses of Electric Power in Southern California and Probabilities of Future Growth with Reference to Sources of Hydraulic Power. The article was presented at the Fall Meeting of the A. S. C. E. at San Francisco.

'04. A daughter, named Eleanor Margaret, was born on August 13, 1922, to Mr. and Mrs. Ross M. Riegel of New Cumberland, Pa.

'05. Captain Frank C. Tolles has an article in the September 28 Engineering News Record on Street Cleaning Methods and Costs at Akron, Ohio.

'06. Clarence E. Boesch and Charles S. Rindsfoos have been transferred from Associate Member to Member in the American Society of Civil Engineers.

'07. Charles W. Linsley is President of the Cornell Club of Oswego County, Oswego, N. Y.

'07. Jerome Cochran M. C. E., Secretary Treasurer of the Texas General Contractors Association, visited the School during registration week. Cochran is on a trip through the country visiting local contractors associations.

'08. John C. Brigham has been reelected City Engineer of the city of Summitt, N. J.

'09. Twins were born to Mr. and Mrs. Sydney L. Chaffee of Chalmers, Ind., on July 21, 1922. They have been named Ruby Evylyn and Ruth Evangeline.

'09. Howard P. McKown is Engineer for J. Toner Barr, Contracting Engineer, Pittsburgh, Pa.

'10. Warren E. Day is General Superintendent with the Phoenix Utility Company at Albemarle, N. C.

'10. Carrol R. Harding has been elected a Member of the American Society of Civil Engineers. Harding is Assistant Consulting Engineer with the Southern Pacific Co., 165 Broadway, New York City and is Secretary of the Cornell Society of Engineers.

'10. Hurlbut S. Jacoby has been transferred from Associate Member to Member of the American Society of Civil Engineers.

'11. Ralph S. Crossman visited Ithaca in the early part of September. Crossman is Associate in the Drawing Department of the University of Illinois.

'13. M.C.E. '14. Professor Nathan W. Dougherty of the University of Tennessee has an article on Traffic Studies in a Tennessee County in the Highway Magazine for October.

'14. Frank Herrman, Assistant State Engineer, Oklahoma State Highway Department, Oklahoma, Okla., has been elected an Associate Member of the American Society of Civil Engineers.

'14. M.C.E. '15. Charles S. Whitney is a member of the firm Hool, Johnson and Whitney, Consulting Engineers of Milwaukee, Wis.

'15. Edwin S. Baker is Secretary of the Cornell Club of Cleveland, Ohio.

'15. Mr. and Mrs. Charles F. Moore announce the marriage of their daughter, Mauda Nye, to Mr. Carl Conrad Cooman on Thursday, the 14th of September, 1922 at Rochester, N. Y. Cooman is Engineer for C. H. Sage, Contractor, Batavia, N. Y.

'15. I. Russell Riker is Secretary of the Cornell Club of Trenton, N. J. His address is Box 154, Lawrenceville, N. J.

'17. John H. Courtney is with the George A. Fuller Co., New Jefferson Standard Life Insurance Building, Greensboro, N. C. He is engaged on the construction of a seventeen story building which will be the largest office building in North Carolina and one of the largest in the South.

'17. John P. Redwood is Construction Engineer for Hopkins and Field on the construction of the water works at Wilson, N. Y.

'18. Adolph O. Infanger and Miss Louise Elizabeth Catherine Stuermer, Vassar '19, were married on June second. They spent part of their honeymoon in Ithaca attending the Reunions and Commencement.

'18. Feng Shu Lu is Assistant Engineer with the Peking-Hankow Railway, Wusih, China.

'18. M. Alfredo Valderrama is with the Mergenthaler Linotype Co., 29 Ryerson Street, Brooklyn, N. Y.

'19, '21. Damon G. Douglas was married on May twenty-first to Miss Susan Post Havey at Orlando, Florida.

'19. Floyd W. Hough is now on duty at Anchorage, Alaska, with the U. S. Coast and Geodetic Survey.

'19. Sigurd Rogde has changed his address to 892 Union Street, Brooklyn, N. Y.

'20. Joseph H. Christian is in the Bridge Department of the Missouri State Highway Commission, Jefferson City, Mo.

'20, M.C.E. Professor Douglas S. Ellis of Queens University, Kingston Ontario, Canada, spent June 26 and 27 in Ithaca on his wedding trip. Ellis served in the war, receiving the rank of Lieutenant-Colonel and was decorated with the Distinguished Service Order.

'20. Joseph M. Smook, Junior Hydrographic and Geodetic Engineer, U. S. Coast and Geodetic Survey, Washington, D. C., has been elected a Junior in the American Society of Civil Engineers.

'20. The latest address of A. VanDuzer Wallace, Jr., is Flat Iron Hotel, Omaha, Nebraska.

'20. Charles C. Woodruff, Jr. has been elected a Junior in the American Society of Civil Engineers.

'21. Kevork P. Bahjejian has been sent to Pottsville, Pa. by the J. G. White Management Corporation to bring up to date the appraisal of the Eastern Pennsylvania Railways Company.

'21. Harold W. Bush and Miss Bertha E. Drake were married on June first, 1922, at the bride's home in Ithaca. After a brief wedding trip Mr. and Mrs. Bush will be at home at 1810 South Seventh Street, Springfield, Ill.

'21. John J. Chavanne, Jr. was married on the 23rd of October to Miss Thalia Augusta Waldron, daughter of Mr. and Mrs. George R. Barnes, at the Church of the Immaculate Conception, Ithaca, N. Y.

'21. James E. Cheston is working on surveys for a proposed power plant about 20 miles below McCall's Ferry on the Susquehanna River. His address is Conowingo Inn, Conowingo, Md.

'21. Mr. and Mrs. Paul Early Fitzpatrick announce the birth of a daughter, Claire Rose, on the 31st of August.

'21. Francis K. Green has changed his address to Box 129, Holden, W. Va.

'21. John L. Guest, Designer in the Engineering Department of the Southern Power Co., Charlotte, N. C., has been elected a Junior in the American Society of Civil Engineers.

'21. Herman P. Odessy has been elected a Junior in the American Society of Civil Engineers. Odessy is a Junior Hydrographic and Geodetic Engineer with the U. S. Coast and Geodetic Survey, Washington, D. C.

'21. Francis A. Regan, Jr. is with the White Construction Company of New York City.

'21. John J. V. Schaefer is superintending the construction of the new Long Beach National Bank, Long Beach, N. Y.

'21. Jeno Stern is a draftsman with the American Bridge Company at its Elmira plant.

'21. Hagop P. Tevonian is a draftsman with the Texas Oil Company at 17 Battery Place, New York City.

'21. William W. Wannamaker, Jr. is an Inspector in the Bridge Department of the South Carolina

State Highway Department, Ridgeland, S. C. He has been elected a Junior in the American Society of Civil Engineers.

'22. Benjamin F. B. Barreto has a position with the Dwight P. Robinson Company, Inc. on the extensive construction work this company is carrying on in Brazil. He may be addressed in care of the company, Caixa Postal 133, Fortaleza, Ceara, Brazil.

'22. Samuel Burns is with the Fred T. Ley and Co., Inc. at Fulton, N. Y. on a contract which calls for the construction of three school buildings.

M.C.E. '22. Tsu Y. Chen is a draftsman with the American Bridge Company at Elmira, N. Y.

Ex-'22. Thomas D. Finn, Jr. is with the Standard Oil Co. at Yokahoma, Japan.

'22. H. Garfinkel, A. Josephson, C. S. Liu and S. C. Chao are draftsmen at the Elmira plant of the American Bridge Co.

'22. Robert B. Garrabrant is working on surveys for a proposed hydro-electric plant on the Susquehanna River about twenty miles below McCall's Ferry. His address is Conowingo Inn, Conowingo, Md.

'22. Charles W. Gulick and Miss Olive M. Temple, A.B., '22, were married on June sixteenth, 1922, at the home of the bride's parents at Gouverneur, N. Y. Immediately after commencement they left by motor for Los Angeles where Gulick has a position with the Llewellyn Iron Works.

'22. James Hannigan, who remained in Ithaca after commencement, working with Fred T. Ley and Co., on the new Heating Plant, has been transferred to Green Island, Troy, N. Y., where the Fred T. Ley Co. is erecting a new plant for Henry Ford.

'22. Edward W. Lauek is with the Truss Con Steel Company, Dickson Building, Norfolk, Va.

'22. Thomas E. Mae Mannis is teaching mathematics and directing athletics in the High School, Matewan, W. Va.

'22. Arthur J. Maahs is with the Eastern Petroleum Co., Union Building, Charleston, W. Va.

'22. George R. Shanklin is Assistant Engineer with the West Indies Sugar Finance Corp. at Barahona, Santo Domingo. Shanklin worked with the N. Y. State Highway Department most of the summer, leaving Ithaca the latter part of August.

'22. "Larry" Hoyt has returned from Europe and is working with his uncle in Brooklyn, N. Y. He was in Ithaca for the Colgate game.

'22. "Rex" Daddysman left Ithaca about the first of October for a trancontinental trip by motor. His address is 1621 Sutter St., San Francisco, Calif.

'22. Peter F. Girard gives a new address at 29 Edgerton Road, Arlington 74, Mass.

'22. "Slim" Bryant is now working in the Maintenance of Way Department of the New York Central Railroad.

Fraternity Groups

We are now making appointments for the 1923 Class Book.

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BETTER LIGHTING NEEDED IN INDUSTRIAL PLANTS.

In a paper read before the Illuminating Engineering Society, February, 1920, entitled, "A Survey of Industrial Lighting in Fifteen States," R. O. Eastman submitted some very interesting data regarding the lighting conditions in industrial institutions. The survey comprises some 446 institutions, in which lighting was considered by 55.4% as being vitally important, and by 31.6% as being moderately important, and by 13% as being of little importance. Practically 58% considered that lighting was as important as power in the operation of the plant, and a small proportion would give more attention to lighting than to anything else.

In considering the present condition of lighting as found in the various plants, only 9% ranked as excellent, about $\frac{1}{3}$ ranked as good, 29% fair, 18.8% poor, 3.5% very poor, and 7.8% partly good and partly poor. It was found that the lighting in the offices was far superior to that in the shops; 19% being excellent, 36% good, 31% fair, and only 13% poor and none very poor.

On consulting the executives regarding what factors were most important in considering lighting, the following facts were revealed: Increase of production 79.4%, decrease of spoilage 71.1%, prevention of accidents 59.5%, improvement of good discipline 51.2%, and improvement of hygienic conditions 41.4%. Manufacturers who have good lighting appreciated its value largely from the standpoint of its stimulating effect upon output.

There is no question that any intelligent man who carefully considers the necessity for good lighting in an industrial plant, will agree that it is impossible for a person to do as good work, either in quality or quantity, in poor light as in good light, but yet the result of a careful analysis discloses the fact that only about 40% of industrial plants are furnishing good light to their workers and 60% are operating under poor lighting. It is hard to understand why such a proportion of concerns can be satisfied with a condition which is universally admitted to be a curtailer of efficiency and a prolific causer of accidents. The principal cause of this condition is that those in charge of such establishments have not given the attention to lighting that it demands. They do not know what constitutes good lighting, and in their absorbing interest of other factors of production have overlooked a vital one.

Every safety official should deeply interest himself in the lighting of his plant and insist upon good lighting as much as good goggles, good guards and other necessary accident prevention equipment. Every production manager should insist upon good lighting because the efficiency of the working force is increased by the condition of the lighting furnished. The plant physician should examine the lighting, for eye strain and eye fatigue are directly affected by poor lighting, as is the hygienic condition. Well lighted plants are invariably cleaner than poor lighted places. Plants equipped with Factrolite Glass in all windows are well lighted.

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THE CORNELL CIVIL ENGINEER

Monthly publication of the
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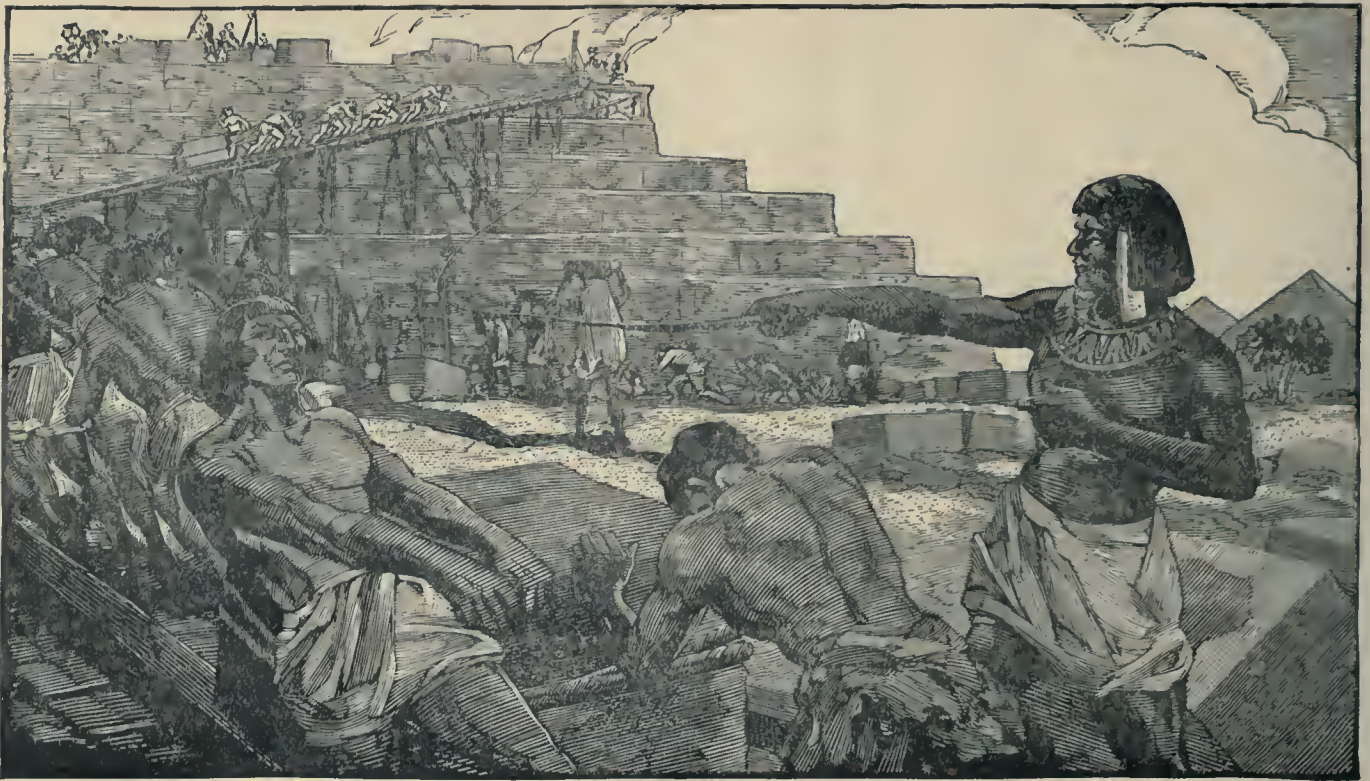
MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

VOL. XXXI, No. 3

DECEMBER, 1922



Sounding in the Canadian Hydrographic Survey
(See page 28)



The Pyramids of Gizeh

Herodotus records that 100,000 workmen toiled for a generation to build the great Pyramids of Gizeh, tombs for Egypt's kings.

Cubes of stone as large as ten feet were quarried by driving wooden wedges into grooves in the rock and then soaking them with water. The swelling of the wedges cracked the stone which was transported to the Nile over mountains and valleys on water-bound, rock roads similar to macadam roads.

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Hercules Special No. 1 contains nothing but the highest grade of standard materials. Its wide use for years is proof of its economy and dependability. We will gladly tell you whether it is suited for your work.

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THE CORNELL CIVIL ENGINEER

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DECEMBER, 1922

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What does *Koehring Dominant Strength Concrete* mean to the Contractor—Owner-Engineer?



(1) Blade cuts through materials with churning action. (2) Blade carries materials up, spilling down again against motion of drum. (3) Materials hurled across diameter of drum. (4) Materials elevated to drum top and cascaded down to reversed discharge chute which (5) with scattering, spraying action, showers materials back to charging side for repeated trips through mixing process.

TO the contractor, it means reduced surfacing costs because dominant strength concrete is plastic, flows into the forms readily, is easily worked, and gives a good surface. To the owner, it insures a structure of good appearance — and of greatest inherent worth — To the engineer, it brings the assurance that the concrete will have the strength that he assumes in his design.

The Koehring Five-action Re-mixing Principle prevents separation of aggregate according to size—coats every particle of aggregate thoroughly with cement, and delivers uniform, plastic concrete to the last shovelful of every batch.



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EVERYWHERE you see the ravages of Consumption. There were 1,000,000 cases and 100,000 deaths from this scourge last year. But if all that see these words will help,

It can be stamped out

Buy the Tuberculosis Christmas Seals where you see them sold. (A picture of one is below.) The revenue from these sales is devoted to a great organized campaign against Tuberculosis. This campaign gives the service of doctors and nurses to millions of the stricken. It organizes local associations. It carries on educational work in schools and offices and factories.

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*Stamp Out Tuberculosis
with Christmas Seals*

The National, State, and Local Tuberculosis Associations of the United States

STUDY OF AN ELEVATION, IN INDIAN INK

FROM "DEPARTMENTAL DITTIES"
By RUDYARD KIPLING

Published by Special Permission of Mr. Rudyard Kipling
Through Courtesy of Messrs. A. P. Watt and Son, London.

*This ditty is a string of lies.
But—how the deuce did Gubbins rise?*

POTIPHAR GUBBINS, C. E.,
Stands at the top of the tree;
And I muse in my bed on the reasons that led
To the hoisting of Potiphar G.

Potiphar Gubbins, C. E.
Is seven years junior to me;
Each bridge that he makes either buckles or breaks,
And his work is as rough as he.

Potiphar Gubbins, C. E.
Is coarse as a chimpanzee;
And I can't understand why you gave him your hand,
Lovely Mehitable Lee.

Potiphar Gubbins, C. E.
Is dear to the Powers that Be;
For They bow and They smile in an affable style,
Which is seldom accorded to Me.

Potiphar Gubbins, C. E.,
It certain as certain can be
Of a highly paid post which is claimed by a host
Of seniors—including Me.

Careless and lazy is he,
Greatly inferior to Me.
What is the spell that you manage so well,
Commonplace Potiphar G.?

Lovely Mehitable Lee
Let me inquire of thee,
Should I have riz to where Potiphar is
Hadst thou been mated to Me?

THE CORNELL CIVIL ENGINEER

and

Transactions of the Association of Civil Engineers of Cornell University

Reprints of articles may be made by other publications, provided that full credit is given to "The Cornell Civil Engineer" and to the author of the article.

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Vol. XXXI

DECEMBER, 1922

No. 3

EDITORIALS

ANNOUNCEMENT

The Cornell Civil Engineer takes pleasure in announcing the election of Willard Beahan, '78, Col. Henry R. Lordly, '93 and Earl J. Sherk, '20 as members of the Alumni Advisory Board.

INTEREST IN THE PRESS

It is very gratifying to find occasional proof that some civil engineers take a keen interest in things apart and outside of their narrow professional domain. We refer to the civil engineer's interest in the press. For obvious reasons the civil engineer should take much interest in journalism. It is not only a way of keeping in touch with the affairs of the world but also a very good publicity medium by which to spread the gospel of the civil engineering profession. But alas, the civil engineer uses this medium all too infrequently. It is, therefore, just cause for commendable comment when we do run across one of those rare instances in which a civil engineer has a letter in defense or explanation of his profession published in a newspaper. More credit is due if the letter be published on the editorial page of a large metropolitan daily.

We take pleasure in quoting from a letter written by Mr. Benjamin Folsom and published in the **New York Times** for June 24, 1922:

"Today's paper says that Frank Munsey has gone to survey; Mike de Young has finished his survey; Dr. Dorrance has finished his on the soup situation of Central Europe. E. W. Harden has just finished up his survey and is home all played out. Frank Vanderlip is still over there surveying.

"If this keeps up there won't be enough transits left in the country for the poor civil engineers to work with who have to do their surveying at home. What's to be done about it? When are the results of these surveys to be placed on record so that those of us who have never learned to survey will have a chance to see what real surveying done by experts looks like."

This letter accomplishes a purpose. From the civil engineers' standpoint it helps to clarify the meaning of the word survey. It is written in a

clever satirical style—a style which cannot help but impress. It is a boost for the civil engineering profession and there should be more letters like it in our daily papers.

DELTA CHI

Last year we learned that the Trustees of the University had accepted the Delta Chi fraternity house on the Knoll as a dormitory for certain students in the College of Law. The donors of the building stipulated that the students who were to lived there should be selected from the College of Law, by a council of Faculty members and Trustees, on the basis of high scholarship and character.

This is a new experiment in the Cornell community. It is an innovation because it combines an honorary society with a dormitory. The avowed purpose of the donors is "to further the interests of the University particularly through the improvement of the College of Law".

We question whether the practice of segregating a select group of men having like interests, into the same living quarters will be beneficial either to the men or to the University. In the first place one of the advantages of an education is the ability to view human affairs in a broad light. One means of doing this is by living among, and coming in daily contact with, students following other courses and having different aims and ideals. In the second place the progressive plans of a great university must depend for their support upon an enthusiastic body of alumni urged forward by a united and loyal allegiance gained during their undergraduate days. Here on the campus we find a great menace to a united Cornell spirit in the tendency of fraternal and college groups to split with one another. Absorbed in the interests of their own group they lose touch with others and work only for themselves.

On this account we question whether an institution such as typified by the Delta Chi experiment works for the best education of the men or fosters a true Cornell spirit. We would not like to see any college, and especially our school of C. E., follow the example as a precedent.

Hydrographic Survey in Canada

A Brief Account of the Work Being Now Carried Forward by the Canadian Hydrographic Survey

By REGINALD W. BENT, ^{C. E.} '13
Junior Hydrographer

With the steady increase in the size of ships, and consequently their value and cost of operation, any measures that can be taken, either for their protection or to shorten the voyage, become of more importance. This is the sphere of hydrographic surveying, and in this article a short account will be given of this work as carried on in Canada.

The establishment of the Canadian Hydrographic Survey consists of the Chief Hydrographer, W. J. Stewart; Assistant Chief Hydrographer, Capt. F. Anderson; five field parties, and drafting room staff including engravers. In addition there are generally several shore parties engaged in harbour surveys.

The work already done includes surveys of the Canadian portion of the Great Lakes and St. Lawrence River, Lake Winnipeg, Lake Melville (Labrador), and parts of the following: Hudson and James Bays, the Pacific and Atlantic coasts of Canada and Gulf of St. Lawrence. An active part has been taken, in recent years, through harbour surveys, in determining the termini of several of Canada's railways.

There are five ships in commission at present of which one is working on the Atlantic coast, another in the Gulf of St. Lawrence, a third in the Lower St. Lawrence, and two on the Pacific coast. These ships are 175 feet in length, with gross tonnage of about 760 tons, and have a crew of about forty. Two launches, two gigs and a dory or two are carried. The surveying staff on each consists of the officer in charge and four others.

The shore parties either secure accommodations with people living near their work or camp. Their work is done with a launch and gig and probably a dory also, as the latter are found very useful landing in shoal water or on mud flats. These parties are quite small; about two surveyors and six or seven men.

Operations in the field last from about May 15th to Nov. 15th and consist of triangulation; ship, launch and boat sounding; location of channels; location and examination of shoals and other dangers to navigation; coast-lining; observations for latitude and longitude; stream metering; magnetic observations; calibration of direction finding stations; erection of ranges for testing and correcting ships' compasses; tidal observations and securing water samples for temperature and salinity tests. Examination of a reported shoal or other uncharted danger to navigation may be included, as well as the investi-

gation, in the field, of evidence taken in connection with the investigation of the cause of a shipwreck.

Triangulation

The first work in the field is the triangulation, and this is extended to cover the stretch of shore included in the season's work. After the points for the primary stations have been selected, and the stations built and observed, the computations are made and the stations plotted on the "rough" or work sheet. All other prominent objects as lighthouses, mountain peaks, church spires, houses, conspicuous trees, etc., are cut in from any station from which they may be visible, and plotted on the rough sheet to be used as fixing marks. Sometimes to make it more conspicuous, the owner will permit a building to be given a coat of whitewash.

Secondary stations are also built to supply more points for fixing when ship and boat sounding, and coastlining. The stations are whitewashed and two flags, a white and a black, are added. Very often when one flag is invisible, owing to weather conditions, the other can be seen.

Whenever possible, stations of the Geodetic Survey are included in the triangulation, and the checking of the two surveys has been very satisfactory.

Ship Sounding

Parallel lines of soundings, at right angles to the general direction of the shore, starting from as close in shore as the ship can be navigated with safety, are carried out for about 25 or 30 miles. This is about the outer limit of fixing with shore points. The position of the ship, when the cast of the lead is taken, is fixed by sextant angles to shore points, and the position is immediately plotted on the rough sheet. Soundings are taken at such intervals that the lines are about a quarter of an inch apart on the work sheet regardless of the scale. Some of the lines are dropped when deep water is reached so that at the outer end they are about a mile apart.

Fixing from the ship does away with landing and taking off observers, perhaps in "sloppy" weather, and thereby saves considerable time, and also makes it possible for parallel lines of soundings to be taken even where there are strong currents as, if necessary, the heading may be corrected as soon as the fix is plotted. The sounding is reduced to the datum used and placed on the rough sheet with the nature of the bottom.

The leadsman is placed well aft on the ship and, for dropping, the lead is attached to a carrier that runs on a cable stretched from the stern of the ship

to the outer end of a boom placed well forward. The lead line used is about three-eighths of an inch in diameter. An automatic depth recording device is used. This consists of a revolving part, on the principle of a propellor, that revolves about a vertical axis as the machine descends, and is geared to a register. It is attached to a 60-pound lead which carries it down rapidly, and it "locks" as soon as "heaving in" begins. The ship steams at from 6 to 7 knots, and the leadsman knows by the slackening of the line when the lead has struck bottom. The line is "hove in" by a steam winch, and samples of the bottom are brought up at each cast.

With the ordinary lead line it is necessary to stop the ship for each cast in depths of 50 fathoms or over. In the Lower St. Lawrence strong currents, of a maximum of 8 knots are encountered and these swing the ship off the line when stopped. So a piano wire was substituted for the lead line, and a lead of 65 pounds used. The lead sinks with a uniform velocity of about 18 feet per second, and casts of 225 fathoms have been taken without stopping with the ship steaming at 7 knots. The wire is hove in by an electric winch, and the whole operation takes about 4 minutes per cast.

After fixing from the bridge is no longer possible, the "crow's nest" is resorted to. This is a cask fastened to the foremast about 40 feet above the bridge. By this means fixing is possible for 8 statute miles additional.

Except where there is a low coast, fixing from shore points can be done up to 25 to 30 miles off-shore, and outside of that astronomical observations are used. Where the shores are low, and fixing becomes difficult a few miles off, resource is sometimes had to buoys with flags. These are anchored; their position fixed from shore points and then they are used to carry the lines of soundings further off. It may be necessary to use a second set of buoys outside, and fixed by means of, the first set. This method was used in Hudson and James Bays. Another scheme used, under similar circumstances, was to anchor the ship, fix its position and use it as an auxiliary station. The boats ran lines of soundings radiating from the ship; their position is fixed by masthead angles from the boat and compass bearings from the ship. A masthead angle consists in measuring, with a sextant, the angle between the masthead of the ship and some other fixed line on the ship's side.

Recently, fixing by means of Direction Finding radio-telegraph stations has been tried. Two shore stations, that will give a good intersection to the position of the ship, are selected, and the bearing of the ship from each station taken simultaneously with the cast of the lead. As most D. F. stations have an index error that generally varies with the bearing, it is necessary to calibrate the station first. This is done by comparing the bearing given by the D. F. station with the true bearing determined by a

sextant fix of the position. So far only the D. F. stations, established by the Canadian Government for mercantile purposes, have been used, but these may be supplemented by smaller, portable ones.

Launch and Boat Sounding

The in-shore sounding is done with a gasoline launch or five-oared gig using either a hand lead line, marked in feet and fathoms, for shallow water or a small Lucas machine for greater depths. As a rule, locating the position of the soundings is done by sextant fixes, though in harbour surveys it is sometimes done by observers on shore. Boat boards, about 2 feet square, duplicates of a section of the rough sheet are used in boat sounding. At the end of the day, all work done is transferred to the rough sheet. One or two surveyors would be in the launch; one of whom takes a sextant angle and records and the other takes the second angle and plots the fix. By this method, as in ship building, parallel lines of soundings can be taken. A range is picked up on shore to steer by. A boat log is used, but only for spacing the soundings between fixes. The distance between soundings varies, depending upon the depth and nature of the bottom, but they should be close enough together to not miss any danger to navigation.

Boat sounding in a gig is practically the same as the above, except that there is only one surveyor on board, and with steering the boat, taking angles, recording fixes and soundings, and plotting fixes, his time is pretty well occupied.

Channels and Shoals

A very important feature of the work is the examination of channels. These are carefully sounded, and possibly swept, to a certain depth, and leading marks picked out. These may be some natural and well defined object near the shore line, or light-houses or beacons erected for the purpose.

When ship or boat sounding, any indications of shoals are noted, and on a calm day these places are very carefully examined with the boats to determine the least water, nature of the bottom and extent of the shoal. If possible, cross ranges of objects on shore, that can be easily picked up, are chosen to clear the shoal.

Coastlining, Metering, Variation and Topography

Prominent features of the coast line, as capes, extremes of islands, etc., are located by sextant fixes, and also cut in from the triangulation stations. These give fixed points from which to start the coast-line or sketch of the high water mark. Between these points the coast line is traversed with stadia or ten-foot pole, using the triangulation stations as control points, or sketched in from a boat, using a log for distances between the fixes. Coastlining includes the features of the shore as, cliffs, woods, boulders, watering places, landing for boats, roads, etc. The field sketch is generally made at twice the

scale of the work sheet, and unnecessary detail, that cannot be plotted, is omitted.

Coastlining, by means of photographs from airplanes, has been under consideration, but has not yet been adopted.

The rivers of the district are surveyed, the current velocity determined by metering or otherwise, and tidal influence and navigability determined.

The observations made for declination cover a period sufficient to give the yearly change.

Sufficient topography must be included, especially conspicuous objects as mountain peaks, to enable the mariner to identify the land.

Wireless

By means of the wireless, daily time comparisons may be made with shore stations either American or European, and the "rates" of the chronometers well determined for use in astronomical observations.

Incidentally, the wireless supplies the ship with daily "press despatches" both British and American, and these are most welcome, especially when the ship is in some locality where the ordinary means of communication are not of the best.

Hindrances

Fog is, probably, the greatest obstacle to hydrographic surveying. The marks, except when very close in shore, are at least several miles away, and it only takes a little fog to make them invisible.

Gales also interfere with the work, especially as for a day or two after the wind goes down there may be a heavy roll.

It is quite likely, though, that when the weather conditions are not suitable for one kind of work, something else can be done.

Ice increases the difficulties in some cases as in Hudson Bay, more especially going and returning. One of the survey boats, the U. S. S. *Acadia* was built for ice breaking.

Office Work

At the close of the field season, the parties return to head-quarters in Ottawa, and prepare the finished or "fair sheet" from the "rough" or "work sheet" of the season's work. The fair sheet gives tidal information, variation, leading marks, clearing marks for dangers, etc. The fair sheet is either sent to the engravers or photolithographed.

In addition to issuing new charts, the Survey keeps all existing charts up to date. This consists of adding any changes as, new lighthouses built, improvements to harbours, dredging, etc. Uncharted shoals are sometimes reported, and then the locality is examined and any danger to navigation found, is added to the charts of the region.

Warnings of any change in buoys, lights, etc., or uncharted shoals discovered are sent to all parties concerned. These are called "Notices to Mariners", and include anything of interest to masters of ships. During the progress of the survey, careful notes are made of the district, and these are issued in the form

of "Pilots" to supplement the charts. These give a detailed description of the locality, courses, specific directions for all channels including leading marks, dangers and clearing marks for same, variation, tidal information, etc.

The charts published by this Survey, of both inland and coastal waters, number one hundred and thirty.

CHANGES OF ADDRESS

- '92 C. H. Clark—from 1716 E. 81 St., Cleveland, O., to 3057 E. Derbyshire Rd., Cleveland Heights, O.
- M. C. E. '93 J. C. Nagle—New address—Court House, Dallas, Texas.
- '94 C. M. Ayres—from Holt, Ala., to Tuscaloosa, Ala.
- '01 I. C. Brower—New address—58 Oneida Rd., Pontiac, Mich.
- '05 C. L. Bogert—from Elm St., to 378 Morning-side Terrace, Teaneck, N. J.
- '07 H. A. Brainerd—from 3905 Hawthorne Ave., to 2712 Chelsea Terrace, Baltimore, Md.
- '08 J. C. Brigham—from 16 Shadyside Ave., to 146 Maple St., Summit, N. J.
- '08 C. W. Diefendorf—from 203 W. Borden Ave., Syracuse, N. Y., to Clyde, N. Y.
- '12 R. W. Austin—from 612 Myrtle Ave., Albany, N. Y., to 333 W. Main St., Amsterdam, N. Y.
- '12 M. M. Bird—from 414 Cherry St., Ranger, Texas, to 4420 Ross Ave., Dallas, Texas.
- '12 J. T. Child—from 1940 Oxford St., to 94 Gorsline St., Rochester, N. Y.
- '14 J. D. Burrage—from 337 Washington St., Newton, Mass., to 305 Academy St., Jersey City, N. J.
- '15 C. D. Abbott—business address changed from 31 Milk St., to 184 High St., Fort Hill Sq., Boston, Mass.
- '15 Capt. P. E. Bermel—from Fort Sam Houston, Texas, to Camp Humphreys, Va.
- '17 J. H. Courtney—from 218 Eddy Street, Ithaca, N. Y., to the care of George A. Fuller Co., Greensboro, N. C.
- '17 D. T. Guilbert—from 536 W. 113th St., N. Y. C., to 311 W. 101st St., N. Y. C.
- '19 M. C. E. '20 C. A. Wright—from 22 Kress Park, to 10 Woodbine Ave., New Rochelle, N. Y.
- '20 H. S. Fisher—from 499 Plymouth Ave., Buffalo, N. Y., to 85 Whitney Place, Buffalo, N. Y.
- '21 H. W. Bush—from Warsaw, N. Y., to 1810 S. 7 St., Springfield, Ill.
- '21 Marcus Sagal—from 1815 Linden Ave., Baltimore, Md., to Box 591, Pittsfield, Ill.
- '22 R. S. Anderson—from Hammond Court, Washington, D. C., to 107 Halsey St., Newark, N. J.



SCHOOL NOTES

THE JOHNNY PARSON CLUBHOUSE

A wonderful tribute was paid to Professor John T. Parson, head of the Department of Drawing in a recent leading editorial of the **Cornell Daily Sun** which follows in full:

"A quarter of a century ago, realizing the benefits to the University lying dormant in Beebe Lake, a professor on his own initiative, began improvements there in order that Cornell students and Ithacans might have the opportunity of using the lake for winter sports."

"Previous to that time undergraduates had practically no place to skate. At his own expense John T. Parson, professor in the College of Civil Engineering, employed men to scrape the snow off the ice, and put it in condition for use. He had a small shack built as a warming house for the comfort of sportsmen. A short time later at his own expense he had a wooden toboggan slide erected which proved one of the most popular of winter sport facilities."

"Later the work which Professor Parson had done was taken over by the Minor Sports Association of the University. While he was reimbursed to a great extent for his labor, he rendered a service to the undergraduates which can never be repaid. Had it not been for his loyal and wholehearted support to an adventurous enterprise the students of that day would have had no such opportunities for skating and tobogganing."

"Now a handsome new winter sports clubhouse is rapidly nearing completion; a clubhouse which the Minor Sports Association has built for the benefit of the University. Instead of the little shack which formerly students were glad to have for their comfort an edifice second to none will soon be at their disposal. In recognition for the invaluable services

rendered by Professor Parson in the pioneer days of Beebe Lake in order that we of today might have a suitable place for our winter sports, it is fitting and proper that it should be known as the Johnny Parson Clubhouse. No greater tribute could be paid to him who gave his energy, time, and financial support to a worthy project."

INTERCOLLEGE BASKETBALL

The soccer season is over, the inter-college cross country run is a thing of the past, and the eyes of the sporting world are turning towards the opening of the basketball season. Of all the inter-college sports, this brings forth the most exciting contests, and awakens the liveliest interests. Last year C. E. had a good team, but this year finds us with only one man of last year's aggregation available. This means that four berths are vacant, and that every possible man must try out for one of these jobs. And remember, Frosh and "Pro" men, you are eligible. We want the five best men in C. E. on the team, and when we get them, we'll annex those all-important ten points that go with every first place. We'll have to face stiff opposition—so it is up to every man of ability to turn out and help form a winning combination. Here is the schedule:

Date	Contest	
Dec. 9—Arch.	vs	C. E.
Dec. 12—Chem.	vs	C. E.
Dec. 16—Law	vs	C. E.
Jan. 13—M. E.	vs	C. E.
Jan. 23—Vet	vs	C. E.
Jan. 27—Arts	vs	C. E.
Feb. 24—Agr.	vs	C. E.

All Saturday games are to be played in the Drill Hall and begin at 4:30. Other games are to be played in the Old Armory and begin at 5:00.

The games will consist of two 15 minute periods.

STUDENT CHAPTER, A. S. C. E.

The second regular monthly meeting of the local Student Chapter of the A. S. C. E. was held in Sibley Dog, Monday, November 6, at 8 p. m. and was a huge success both in attendance and program. Those who missed it, lost a chance to get some real live "dope" which was given by Mr. George B. Nichols, superintendent of construction for the Henry R. Kent & Co. which is building the new heating plant.

President Spurney opened the meeting promptly at 8 o'clock and expressed his satisfaction at the number of resident alumni and faculty members who were present. Prof. Seofield, in commenting on the work of the soccer team, said that a step in the right direction had been made as there were now enough men out for the games. Shingles were then awarded to those who earned them last year, and as these had been lettered by Prof. Parson free of charge, a motion in appreciation of his kindness was passed.

A. W. Crouch '23, chairman of the entertainment committee took charge of the meeting, bringing forth an orchestra composed of D. H. Breen, H. R. Buenano, A. Lucas, and H. S. Woodward, which dashed off some of the latest music. Following this Mr. Nichols was introduced by the chairman.

Mr. Nichols emphasized the labor conditions which had to be considered by the engineer, especially in a town the size of Ithaca when so great an amount of construction work is being carried on. Despite the fact that high prices are being paid low labor supply here has hindered the work.

Leading up to the subject of the heating plant the speaker traced the development of the various plants at present connected with the university, which finally caused the state and university to combine for the third time on construction; the other two projects being the building of Bailey Hall and the Drill Hall. By means of blackboard sketches the arrangement of the heating plant and pipe system in their relation to the university was shown. The laying of the pipes and the method of insulation was explained, the speaker exhibiting samples of the materials used for insulation at various stages of their manufacture.

Concerning the equipment of the plant, the speaker stated that the cost is being kept low due to the generosity of Cornell alumni who are either donating or making reductions on the price of the equipment. In conclusion Mr. Nichols brought forth the fact that four boilers were now in place, with room for a fifth, and that the plant was made so that new additions can readily be made; thereby anticipating a large growth of the university.

A. Alous as a black-faced comedian provided some clever entertainment with his rendition of the "Memphis Blues" and other melodies. E. N. Scott '23 spoke on his work with the New York State Highway Commission this past summer and O. W.

James '23 on his work for Mexican Oil interests on the construction of a large oil reservoir at Baltimore, Md. More numbers by the orchestra and "eats" served by the freshmen ended a pleasant evening.

NOTICE OF NEXT MEETING

The next meeting of the Chapter is scheduled for December 4, and a real live program has been arranged for that date. Besides the stunts and eats, there will be talks given by a number of C. E. seniors and arrangements have been concluded for the delivering of a talk by a man who is an authority in the Engineering world. Every C. E. should make it a point to hear him. The meetings have started off with a bang! Let's keep 'em banging all year and have the best Student Chapter in the country!

SOCCER

The intercollege soccer season closed this month with C. E. decidedly low in percentage. Although all scores were comparatively close and our opponents had to work hard for their victory, the fact remains that ours was the small score in the majority of cases. The turnout for the team, in numbers, was good and by keeping this up, the quality of the team should steadily improve. Notwithstanding our poor start, we still have several opportunities to strengthen our standing in the intercollege athletic race, so, into the rest we go with the best we've got. Soccer scores as follows:

C. E.	vs	AG.	0-1
C. E.	"	VET.	0-1
C. E.	"	ARCH.	0-0
C. E.	"	CHEM.	0-1
C. E.	"	ARTS.	0-1
C. E.	"	M. E.	1-0
C. E.	"	LAW	

ATTENTION

of C. E. students is called to the following prizes which are still to be awarded during the present scholastic year:

Fuertes Memorial Prizes in Public Speaking

1st. Prize of	\$125
2nd. " "	35
3rd. " "	20

Charles Lee Crandall Prizes for the Best Papers on a Suitable Subject in the Engineering Field

1st. Prize of	\$100
2nd. " "	25

J. G. White Prizes in Spanish

Prize of \$100 to the English Speaking Student for Proficiency in Spanish.

Prize of \$100 to Spanish Speaking Student for Proficiency in English.

ERROR

In the publishing of the article "Hinekey Reservoir Operations", in the October issue, the Cornell Civil Engineer wishes to rectify a mistake which was made during the printing of the article. The title of the diagram appearing on the top of page 4 should read: "Drafts with Perfect and Practical Regulation, 1907-1918"

In Memoriam

Frank S. Washburn '83

Frank Sherman Washburn, chairman of the board of directors of the American Cyanamid Company, president of the Goodman Manufacturing Company of Chicago, and a leader in American Engineering, died at his home in Rye, N. Y. on October 9, of bronchial pneumonia.

He was born in Centralia, Ill., on December 8, 1860, the son of Elmer Washburn, a former president of the National Livestock Bank of Chicago. He entered Cornell in 1878, being graduated with the degree of B. C. E. in 1883. After graduation, Washburn became associated with railroad engineering in the Middle West. He reorganized the belt line of the Union Stock Yard and Transit Company and then was sent abroad by the Chicago and Northwestern, Illinois Central and several other companies to study railway economies in Europe.

Upon his return in 1889, Washburn played an important part in the development of Purdy's Dam Reservoir and other sources of New York water supply. Later, he went to Chile as consulting engineer in connection with the production and shipment of Chile's nitrate of soda. His next important work was in connection with the building of an inter-oceanic canal in Central America, a project which was abandoned when the Government undertook the Panama Canal.

After some years spent in developing coal and iron mining and water power projects in the South, Washburn saw the possibilities of application of hydro-electric power to the fixation of air nitrogen for the manufacture of fertilizers. The result was the organization of the American Cyanamid Company. Factories were erected at Niagara Falls on the Canadian side, which since have developed an annual production of cyanamid for fertilizer and chemical use valued at more than \$10,000,000.

Before the war, Mr. Washburn foresaw that, if the Chilean supply of sodium nitrate, upon which the United States depended for the making of military explosives, were cut off, this country would be seriously menaced. As early as 1910 he gave his thought to a means of making America independent of South American deposits so that, in event of a blockade, the country could produce its own nitric acid. The German Government had already started on a large scale, for military purposes, the same fixation of air nitrogen which Washburn and his associates had applied to agriculture.

So, with the entrance of America into the war, Washburn and the American Cyanamid Company were requested by the Ordnance Department to organize the Air Nitrates Corporation to construct and

operate for the Government the huge \$50,000,000 air nitrates plant at Muscle Shoals, Ala. The Armistice came before these operations were completed, however.

Mr. Washburn was married in 1890 to Miss Irene Russell of Augusta, Ga., who survives him with a son, Frank S., Jr., '20, a daughter and two sisters.

He was a trustee of Cornell for two terms, and also for Vanderbilt University. He was a member of the American Society of Civil Engineers, the American Institute of Mining Engineers, the Society of Western Engineers, the American Institute of Electrical Engineers, the American Electro-Chemical Society, and Sigma Xi. Among his clubs were the University, Alpha Delta Phi, Apawamis, and the Century.

Thomas B. Bryson '94

Thomas Bines Bryson died at his home in New York on September 5 after a brief illness. He was born in Mechanicsburg, Pa., in 1872, entered Cornell in 1890, receiving the degree of C. E. in 1894. He was a member of Alpha Tau Omega.

After leaving college, Bryson became a draftsman for the Pencoyd Iron Company of Philadelphia. A year later, he became associated with J. W. Hoffman with whom he obtained his first experience in the contracting business. In 1900, he went to New York and entered the employe of the John F. O'Rourke Company, specializing in foundations and pneumatic machinery. He was also in active charge of a number of difficult foundation jobs, among which was that of the Stock Exchange Building in Wall Street. Five years later, he entered private practice, making a specialty of foundations and tunnels.

Bryson carried out many large projects during the ensuing years. One of the sections of the 4th Avenue Subway in Brooklyn was constructed with great success with the aid of some original methods. For a number of years, he had been vice-president and general manager of the Holbrook, Cabot and Rollins Corporation and was widely known through the many large contracts which he successfully carried out. In this capacity, he took a contract for the completion of Dry Dock No. 4 at the Brooklyn Navy Yard, a particularly difficult piece of work which had been in progress for six years or more. The preceding contractor used coffer dams unsuccessfully. Bryson sank a series of caissons through rock around the entire dry dock, and three lines of caissons under the floor. The contract was successfully completed well ahead of the specified date. Another project was that of the section of the Aqueduct Tunnel from Cooper Union, N. Y. to

Brooklyn, under the East River, a sixteen foot bore through solid rock. At the time of his death, Bryson was actively engaged in the construction of the foundations for the piers and abutments of the new bridge from Philadelphia to Camden. This job involved the sinking of two of the largest pneumatic caissons ever built.

Bryson has been closely identified with the American Society of Civil Engineers, and was, at one time, president of the General Contractors Association of New York. He was recognized as of preeminent ability in foundation work from a technical point of view, and was also distinguished by his ability to handle men. He obtained, not only the hearty co-operation of his associates, but the highest degree of loyalty and friendship. He was a member of the Cornell Club of New York, the University Club, the Metropolitan Club, the Engineers Club, the Oakland Golf Club, and the Apawamis Country Club.

He was a nephew and close associate of Theodore Cooper, one of the most noted bridge engineers in the country.

Bryson is survived by his widow, Mrs. Maude Winter Bryson, whom he married in 1910.

William H. Schmidt '94

William Henry Schmidt, aged 62, died at his summer home in Bay Shore, Long Island, on September 29, after two years illness of anaemia.

Schmidt entered the University in 1889, and received the degree of C. E. in 1894. He was a member of Zeta Psi, Friuja, Bench and Board, Mermaid, and the Civil Engineers' Association. He was also a member of the Senior Ball Committee. For a number of years, he had been vice-president and treasurer of the United Engineering and Contracting Company of New York, which helped build the Pennsylvania tubes under the Hudson River, and had done work for the company in Russia and Cuba. Besides this, he was second vice-president of the Commonwealth Bank, and a trustee of the Citizens' Savings Bank. He was a member of the Engineers' Club and the University Club of New York.

He is survived by his widow, Mrs. Mary Clausen Schmidt.

Thomas Martin, Jr. '08

Thomas Martin, Jr., died at his home in Lansdowne, Pa., on March 11, following an attack of influenza. He contracted the disease while doing final special work in the tunnels of dry dock No. 3 at the Philadelphia Navy Yard.

Martin was born in Londonderry, Ireland, on September 1, 1881, to Thomas and Elizabeth Donaldson Martin. In his boyhood, the family came to this country, and he received his preparatory education in the schools of Belleville, N. J. Then he attended the Franklin and Marshall School, entering the College of Civil Engineering in 1904, and receiving his degree in 1909.

After a year as surveyor and engineer's assistant, he entered Government service. His first appointment was that of sub-inspector at the Brooklyn Navy Yard; later he became structural aide. From 1912 to 1917, he made subsurface and topographical surveys at various Navy Yards on the Atlantic Coast. In 1917, he was appointed chief inspector on on-track work at the Philadelphia Navy Yard.

On June 8, 1907, Martin married Miss Daisy M. Prutzman of Duryea, Pa. She and five children survive him.

Francis A. J. Mack '12

Francis Aloysius Joseph Mack died at his home in Syracuse, N. Y., on October 4, 1921 following an operation for appendicitis.

He was born on August 1, 1888, and prepared at Syracuse High School, entering Cornell in 1908. He received the degree of C. E. in 1913. He was a member of Pyramid.

Mack was one of the men recommended by Colonel Barton to attend the Fourth Officers' Training Camp at Plattsburg in May, 1918. He was later sent to the Field Artillery Officers' Training Camp at Camp Zarehary Taylor, Louisville, Ky., where he received a commission as a second lieutenant.

TAU BETA PI ELECTIONS

In the regular fall elections for the Senior class, sixteen men were elected to Tau Beta Pi. Of these, nine were M. E.; four, C. E.; two, Chemistry; and one, Architect. The C. E. men were Captain David Hazen Blakelock, Harlan Page Bosworth, Jr., Michael William Hourigan and Earl Nims Scott.

PHI KAPPA PHI ELECTIONS

In the Phi Kappa Phi elections this fall, fifty men from the University were honored. The following three Civil Engineers were elected:

Benjamin Henry Palmer
Earl Nims Scott
Harlan Page Bosworth

ATTENTION

of C. E. Alumni is called to the Fuertes Medal for the most meritorious paper upon an engineering subject. Such papers may be books, articles presented before Societies, Government Reports, or manuscripts not yet in type. In any case, they should be in the hands of the Director of the School of Civil Engineering before April 15th of any year.

Detailed descriptions of any of the above Prizes may be found in the University Publication, "Prize Competitions", and in the announcement of the College of Engineering.

ALUMNI NOTES

'92 Charles H. Clark, who is Engineer of Maintenance of Way with the Cleveland Railway Company, is Second Vice-president of the American Railway Engineers' Association. His address is 3057 East Derbyshire Road, Cleveland Heights, O.

'94 C. Morton Ayres is an Engineer and Architect with his office at 410 22nd Ave., Tuscaloosa, Ala.

'99 Calvin L. Barton was elected Mayor of the city of Norwalk, Conn., in October, 1921. Barton is a General Contractor at 1328 Broadway, New York. He resides at 70 West Ave., South Norwalk.

'02 Louis A. Mitchell is Engineer of Maintenance of Way of the Union Traction Company, Anderson, Ind.

'05 Don E. Andrews is Rubber Technologist for the U. S. Rubber Plantations, Inc., of Singapore, S. S. His home address is Fairhope, Ala.

'07 Charles W. Hubbell, consulting engineer, is special adviser to the International Correspondence Schools in the preparation of their course in ship-building. He lives at 37 Fulton Street, Pittston, Pa.

'08 Alvin L. Gilmore, formerly of the Binghamton Bridge Company, and George Harper Young, formerly of the Bethlehem Steel Company, are members of the Binghamton Engineering Company, which has recently completed a number of contracts in Binghamton, N. Y. Among them are a school at Harpersville, the jail at Norwich, the Greene-Coventry Bridge, the Red Men's Building, and the Leveson Block and twenty-five other buildings in Endicott. In the course of construction are St. Paul's Parochial School, the Masonic Temple, and the Port Dickinson Community Church at Binghamton; St. Ambrose's Church, Endicott; and the High School and City Hospital, Corning. The company has just completed work on the addition to the Binghamton Gas Works, which will make possible an immense increase in the amount of gas manufactured daily; also on towers for the high tension lines of the Binghamton Light, Heat, and Power Company, which will serve the Johnson City Plants of the Endicott, Johnson Company.

'08 George C. Hanson, formerly of Bridgeport, Conn., now of Harbin, Manchuria, has been promoted from Consuls of Class 6 to Consuls of Class 5. In 1909, he was appointed student interpreter in China; later he became interpreter at Shanghai. He acted as vice and deputy consul and interpreter at Chefoo from 1912 to 1913 and later filled similar positions at Dainy, Tietsin, Newchwang, Swatow, Chungking, and Foochow.

'08 John M. Lewis is chief engineer for the Houston operations, which include the Houston Coal and Coke Company, the Keystone Coal and Coke Com-

pany, the Tidewater Coal and Coke Company, the King Coal Company, the Houston Collieries Company, the Junior Pocahontas Coal Company, the Thacker Coal and Coke Company, and the Franklin Coal Company. He has been located in Cincinnati, Ohio, since September, 1919, when he was transferred from Elkhorn, W. Va. His office address is 1532 Union Trust Building. Lewis was married on September 2, 1919, to Miss Mary Coker of Rome, Ga.

'09 Percy H. Budd is Superintendent of Construction, Construction Quartermaster Corps, U. S. A. at 39 Whitehall St., N. Y. C. His home is at 84 Mountain Ave., Summitt, N. J.

'09 William R. Ourand is plant engineer with the Willys-Overland Company. He is directing the layout of manufacturing units to improve output and reduce costs, and is assisting in the maintenance of plant buildings and equipment. He resides at 4205 Eastway, Toledo, Ohio.

'09 Romeyn W. Thatcher is civil engineer at the Laekawanna plant of the Bethlehem Steel Corporation. His address is 9 Frontenae Avenue, Buffalo, N. Y.

'10 George P. Donnellan is estimating engineer for the A. J. Krebs Company, General Contractors. His home is at 32 Peachtree Way, Atlanta, Ga.

'10 Howard T. Critchlow is with the New Jersey Department of Conservation and Development as hydraulic engineer in charge of the water resources branch, which undertook, during the past year, a survey of the water supply situation of the Metropolitan District opposite New York. This branch has also established twenty-seven steam gaging stations and is making a statewide survey of all existing dams to determine their stability and safety. Critchlow resides at 577 Rutherford Drive, Trenton, N. J.

'11 Harvey S. Johnson is assistant Western sales manager and sales engineer in the Detroit office of the Bossert Corporation, Utica, N. Y. His business address is 1513 Ford Building, Detroit.

'11 A son, Henry P. Schmeck, Jr., was born on July 10, to Mr. and Mrs. Henry P. Schmeck at Loekport, N. Y. Their present mail address is Box 131, Oleott, N. Y.

'12 John Townshend Child, who is in the Bureau of Municipal Research at Rochester, N. Y., is the editor of the new monthly publication of the Rochester Engineering Society. His address is 94 Gorsline Street, Rochester.

'12 A son, Peter, was born on September 29 at the city hospital to Professor and Mrs. Carl Crandall of 404 University Ave., Ithaca.

'12 Max Grossman and Miss Shirley Rosenberg

were married on October 3 in Atlantic City. Grossman is proprietor of Grossman's Hotel, Atlantic City, N. J.

'13 Russell T. Kerby and Miss Regina Brunner were married on July 31 at the home of the bride's parents at Olean, N. Y.

'13 Paul J. Maxon is general superintendent of buildings with the National City Realty Corporation, 55 Wall Street, New York. He resides at 50 Palisade Ave., Bogota, N. J.

'13 Roger W. Parkhurst, who has been the Connecticut and Rhode Island representative of the Street and Road Department of the Barber Asphalt Company for the past two and a half years, has been transferred to the Foreign Department and sent to Bombay as representative for India, Burma, and Ceylon. He sailed on October 24 for Bombay via London, Marseilles and Port Said. Mail addressed to the care of the Foreign Department, Barber Asphalt Company, 1900 Land Title Building, Philadelphia, Pa., will reach him.

'13 Henry Ten Hagen and Miss Dorothy Gouinlock, Vassar College Graduate, '17, were married on September 16 in Warsaw, N. Y. Edward V. Gouinlock, '23, brother of the bride, was best man. Mr. and Mrs. Ten Hagen will make their home in Warsaw.

'14 The firm of J. A. W. Iglehart and Company, investment bankers, of which Joseph A. W. Iglehart, '14, is president, moved on October 1 to their new offices at 102 St. Paul Street, Baltimore, Md.

'14 A daughter, Barbara Elizabeth, was born on January 29 to Mr. and Mrs. William M. Reek of Syracuse, N. Y. Reek is district engineer with the Concrete Steel Company, Union Building, Syracuse.

'15 Alvin G. Cadiz is sales engineer for the Truseon Steel Company of New York. His home is at Sea Cliff, N. Y.

'15 Errol W. Doebler recently resigned his position with Hazen, Whipple and Fuller, and is now assistant professor of engineering at Swarthmore College. He is also in partnership with W. E. Fuller, of Hazen, Whipple and Fuller. Mr. and Mrs. Doebler and their daughter are living in Swarthmore, Pa.

'15 Thomas F. Keating, Jr., is doing fire schedule and rate work in the engineering department of Pate and Robb, general insurance brokers, 100 William Street, New York. Keating's residence is at 11 East 87th Street, New York.

'16 Captain Gerald E. Brower is taking a year's course in the Air Service Engineering School at McCook Field, Dayton, Ohio.

'16 Captain Luis F. Cianchini is now with the Military Intelligence Division, stationed at Headquarters, 8th Corps Area, Fort Sam Houston, Texas.

'16 William Louis Havens is associated with George B. Gaseoigne, consulting sanitary engineer, Leader-News Building, Cleveland, Ohio. He lives at 12319 Osecola Avenue.

'17 C. C. Carpenter is Engineer and Contractor with his office at Ada, Ohio.

'17 Joseph H. Gray is engaged in development work for the American Telephone and Telegraph Company, located at 195 Broadway, New York. His residence address is 615 Jefferson Ave., Elizabeth, N. J.

'18 William M. Jones is assistant engineer with the Turner Construction Company. His address is 140 Peachtree St., Atlanta, Ga.

'19 William A. Andrews was married, on September 9, 1922, to Miss Effie M. Loudon at Fairfield, Ia. Andrews is Heating and Plumbing Contractor with his business address at 120 S. W. Blvd., Kansas City, Mo. Mr. and Mrs. Andrews reside at 4534 Wornall Rd.

'19 George P. Bullard, who has been with the McClintie-Marshall Company of Pittsburg since his graduation, has recently been made assistant manager of erection.

'19 George S. Hiseock is Engineer with the Buffalo Structural Steel Company at Buffalo, N. Y. His residence address is 306 DeWitt Street. Hiseock was in Ithaca on October 21 for the Cornell-Colgate game.

'19 Mr. and Mrs. George R. Barnes announce the marriage of their daughter, Thalia Augusta Waldron, to Mr. John J. Chavanne, '19, on Monday, October 23, 1922, at Ithaca, N. Y. Chavanne is with the National Board of Fire Underwriters, 76 William St., New York City.

'20 Francis McGrath is an engineer with the State Highway Department of Connecticut now in charge of shore road construction at Southport and Westport. McGrath's home is at 213 South Main Street, Stratford, Conn.

'20 Joseph H. Christian is a designer in the bridge department of the Missouri State Highway Commission. His address is 309 West High Street, Jefferson City, Mo.

'20 Harold S. Fisher, who is teacher of Mechanical Drawing in the Buffalo Technical High School, was down to see the Colgate game on October 21. His address is 85 Whitney Place, Buffalo, N. Y.

'20 Eduard Fritz, Jr., has left the Penn Public Service Corporation and is now designing engineer with the Truseon Steel Company, 31 Union Square, New York.

'20 Vincent B. Lamoureux is taking graduate work in Civil Engineering. He lives at Forest Home, Ithaca.

'21 Samuel D. Brady, Jr., is chief engineer with the Brady-Warner Coal Corporation, Fairmont, W. Va. His residence address is 1201 Fairmont Ave., Fairmont.

'21 Harold W. Bush is assistant engineer in the Bureau of Bridges of the Illinois State Highway Department. His address is 1810 South Seventh Street, Springfield, Ill.

'21 Eiler M. Christensen is Estimator with the McClintie-Marshall Company of Pittsburg, Pa. He is staying at the Y. M. C. A., on East Liberty Street.

'21 Edwin F. Chobot is in the field office of the Phoenix Utility Company on the construction of a transmission line between Badin and Sanford, N. C. He may be addressed in care of the Company, Albemarle, N. C.

'21 Robert C. Kennedy is with the New York State Highway Commission at Rochester, New York, as Junior Assistant Engineer. His home is in East Rochester.

'22 Ross S. Anderson is in the Hay Foundry and Iron Works at Newark, N. J. His address is 107 Halsey Street, Newark, N. J.

'22 B. F. Barros-Barreto is in the employ of Dwight P. Robinson and Company on the Pitoes Dam in a remote and sparsely inhabited section of northeastern Brazil. He reports that the menu consists of rice, beans, and goat meat, with dessert more of the same. He requests friends to write, addressing letters to Caixa, Postal 133 Forteleza, Ceara, Brazil, S. A.

'22 G. Milton Benson is in the Bridge Engineering Department of the Baltimore and Ohio Railroad at the Central Office in Baltimore, Md. His home address is Mayfield Terrace, Halethorpe, Md.

'22 Forrest J. Brown is junior assistant engineer with the bridge department of the New York State Highway Commission. He lives at 65 Jay Street, Albany, N. Y.

'22 Thomas E. MacMannis is teaching mathematics and directing athletics in the High School at Matewan, W. Va.

REVISED FIGURES

An error was made in the November issue in a statement regarding the number of students registered in the School of Civil Engineering this term. That statement was based on figures only for the day of registration. The registration should read as follows:

	21-22	22-23
Sophomores	75	78
Juniors	74	76
Seniors	79	81

The number of Freshmen enrolled was 84. These figures show an increase over the statement in the November issue of 4 in the Sophomore class, and 7 in the Junior class. The number of Seniors is the same.

IN OUR NEXT ISSUE

Lieut. Robert E. Bassler, C. E. '17, will have an article on "The Civil Engineer Corps in the U. S. Navy".

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SHOP LIGHTING.

In an address delivered before the members of the Western Pennsylvania Division of the National Safety Council, Pittsburg, Pa., March, 1918, by C. W. Price, the importance of good lighting in industrial establishments was discussed, and the disadvantages of poor lighting were clearly shown by some figures mentioned by Mr. Price.

A large insurance company analyzed 91,000 accident reports, for the purpose of discovering the causes of these mishaps. It was found that 10% was directly traceable to inadequate lighting and in 13.8% the same cause was a contributory factor. The British Government in a report of the investigation of causes of accidents determined a close parallel to the findings of the insurance company above quoted. The British investigators found that by comparing the four winter months with the four summer months, there were 39.5% more men injured by stumbling and falling in winter than in summer.

Mr. John Calder, a pioneer in safety work, made an investigation of accident statistics covering 80,000 industrial plants. His analysis covered 700 accidental deaths, and of these 45% more occurred during the four winter months than during the four summer months.

Mr. C. L. Eschleman, in a paper published in the proceedings of the American Institute of Electrical Engineers several years ago, reported the result of an investigation of a large number of plants in which efficient lighting had been installed. He found that in such plants as steel mills, where the work is of a coarse nature, efficient lighting increased the total output 2%; in plants, such as textile mills and shoe factories, the output was increased 10%.

In an investigation of the causes of eye fatigue, made by the Industrial Commission of Wisconsin, it was found that in a large percentage of industries, such as shoe, clothing and textile factories, the lack of proper lighting (both natural and artificial) resulted in eye fatigue and loss of efficiency. At one knitting mill, where a girl was doing close work under improper lighting conditions, her efficiency dropped 50% every day during the hours from 2:30 to 5:30 P. M.

The above mentioned incidents indicate how important a factor lighting is in the operation of the industrial plant. It has been well said, "Light is a tool, which increases the efficiency of every tool in the plant." Glare or too much light is as harmful as not enough lighting, and in no case should the eyes of the workers be exposed to direct rays, either of sun or electric light.

Windows and reflectors should always be kept clean; that is, cleaning them at least once a week, for where dust and dirt are allowed to collect, efficiency of the light is decreased as much as 25%.

Good lighting, in addition to its other marked advantages, is a strong incentive towards keeping working places clean, for it clearly exposes any place where dirt or other material has been allowed to collect. White walls and clean windows glazed with Factrolite Glass will eliminate the sun glare and increase the illumination 25 to 50 feet from the window from 38% to 72% as compared with plain glass.

Lighting is of primary importance to every employer and fully warrants a careful investigation of the subject, for there is no substitute for good lighting, and if it is not supplied the efficiency of the entire working force must suffer a serious reduction.

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Monthly publication of the
ASSOCIATION OF CIVIL ENGINEERS
OF CORNELL UNIVERSITY

MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

VOL. XXXI, No. 4

JANUARY, 1923

DIAGRAMS FOR REVIEWING DOUBLY REINFORCED CONCRETE BEAMS

By

CHARLES E. O'ROURKE, C.E. '17

THE CIVIL ENGINEER CORPS OF THE UNITED STATES NAVY

By

LIEUT. ROBERT E. BASSLER, C.E.C., U.S.N., C.E. '17

See pages 40 and 44

Standardized Concrete

—on what does it depend?



(1) Blade cuts through materials with churning action. (2) Blade carries materials up, spilling down again against motion of drum. (3) Materials hurled across diameter of drum. (4) Materials elevated to drum top and cascaded down to reversed discharge chute which (5) with scattering, spraying action, showers materials back to charging side for repeated trips through mixing process.

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and

Transactions of the Association of Civil Engineers of Cornell University

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Vol. XXXI

JANUARY, 1923

No. 4

EDITORIALS

A NEW YEAR

Once again, wishes for a happy and successful New Year are in order. May we take the pleasure of extending such wishes to you? We sincerely hope that the coming year will bring to you all success and happiness even in excess of that which the past year has afforded.

Once more new resolutions are being formulated, resolutions which are meant to govern our conduct throughout the ensuing months. We, the Board of the Cornell Civil Engineer, are among those whose resolutions are beginning to assume a definite form. The preceding Boards for the last four or five years have been encumbered with a debt left over by each Board which held sway before them. The first two or three years of those five saw an increase in that debt. Then began the decrease, and this Board is glad to be able to say that we are commencing the New Year with a clean slate. Perhaps, for this reason, we have more to which to look forward. We are desirous of making the Cornell Civil Engineer a broader and better publication. It is toward that goal that we set our purpose.

To make any progress toward that goal, we must have the whole hearted support of our Alumni. That support must come to us in four ways. First, the Alumni and Students must stand back of us financially. During the past six months, that financial aid has been growing, but we must have more. To produce such aid, more Alumni must subscribe, all subscriptions must be paid to date, and our Alumni must not neglect any chance to boost the Cornell Civil Engineer. All these little things put the magazine on a firm financial basis and keep it there.

Financial support is of great importance, but of equal importance is that aid which may be given the Board through prompt notification of change of address. It is surprising to discover how few changes of address we obtain directly from the person most concerned. In most cases such information comes to us in a roundabout manner, and, as a consequence, that person concerned is apt to miss one or two issues and sometimes even more. We have had cases in which notification of change of address was not received until six months after that change

took place. In order to have a real, live, up-to-the-minute Alumni notes department, we must have your cooperation on this point of notification.

Thirdly, the Alumni can support the Cornell Civil Engineer by contributing articles for publication. If our Alumni would resolve to put forward their best efforts and try to write articles for us when asked, the Cornell Civil Engineer would step forward toward becoming a broader and better publication. If each Alumnus would keep that in mind and use his initiative and send us an article without waiting to be asked to write one, we would greatly appreciate it.

The fourth, and perhaps most valuable way in which the Alumni can cooperate with the Board, is by offering suggestions and criticisms about the magazine. The Cornell Civil Engineer is published for the Alumni in an effort to keep them in touch with their Alma Mater and with each other. We are but the instruments by which the magazine is put out. You are the people to be satisfied and, as such, should make it your business to comment, in writing to us, on anything you may see in the Cornell Civil Engineer which, in your opinion, should be changed. Progress would be more rapid if our Alumni would aid us with favorable or unfavorable criticisms concerning their publication.

The future of the Cornell Civil Engineer is in your, our Alumni's, hands. With your cooperation, this publication would become a more vital necessity to every Alumnus. What are you doing now, what are you going to do in the future, to make it a better, bigger, and more important magazine?

ANNOUNCEMENT

A recent competition was held by the Board to secure additions to the staff from the Sophomore and Junior classes. As a result of this competition, two men were elected to the Editorial staff, and one to the Business staff. Those chosen for the Editorial Board were: W. S. Petrillo, '25, and C. G. Eaton, '25. W. K. Hoyt, '25, was elected to the Business Board. The present Board wishes to express its appreciation for the work done in the competition by F. L. Thompson, '24, S. S. Swindells, '24, N. D. Kenney, '25, and R. W. Shipman, '25.

"LEST WE FORGET"

During the past summer, we visited Washington, D. C., and made it our business to inspect the ruins of the Knickerbocker Theatre. As we gazed on the site of that horrible catastrophe, a muse enveloped us with the following thoughts:

"How long will it be before the conditions and circumstances which brought about this tragedy will be entirely eradicated? Investigations have been made by the score. Of what avail? Are twenty dollar a week clerks still allowed to approve plans? In what condition, from the standpoint of safety, are the millions of public buildings scattered throughout the country? When will building codes become standardized? When will the standards be strictly enforced? Who frames building codes?"

It seems that, in the hustle of modern life, the terrible lesson taught by the Knickerbocker disaster has been forgotten by the layman. But the civil engineer can ill afford to forget it. If he does, sooner or later, he will be rudely reminded of it by a repetition of the fate of the Knickerbocker.

Nor must he remain inactive concerning it even though he does not forget it. Such a disaster calls for immediate action. If building codes in this country are so bad that they permit faulty construction, they must be revised. If proper codes are in existence they must be enforced. Else what use is there for a civil engineer? Is he a mere figurehead in construction, one who meekly submits to pressure and puts up structures which he cannot guarantee?

No, he is a builder, a creator of structures which are quite rightly looked upon as achievements both from the standpoint of ingenuity of construction and from that of quality of service rendered. Failures such as the Knickerbocker Theatre do not belong in this category and hence they are examples of what the work of a civil engineer must not and shall not be.

COOPERATION

A considerable need has been felt, in the past, for cooperation between civil engineers and architects. The erection of a structure calls for a joint working together of these two professions if the structure is to be properly built. For instance, material has been wasted, and structures have been built with faulty members, all because the engineer and architect did not concur. Then too, this lack of cooperation often caused friction.

The need for cooperation was evident for many years before due recognition was accorded it. Finally recognition was shown, and as a result, the civil engineer and the architect have been working together more and more. This has been shown in the changes in the curriculum for the course in architecture. To take a specific example and one which is near at home, let us consider the architects' course

in this University. Here Mechanics has always been a part of their preparation. Until this year, however, no instruction was given them in the elements of concrete construction and design. In a world which is continually growing towards the use of concrete for all purposes, the lack of knowledge in this department greatly hindered construction. This year finds the inauguration, as a part of the regular course, of a course in concrete construction and concrete design.

The realization that in the last analysis, the civil engineer and the architect are both working toward a common goal should have come decades ago. However, it is very unfortunate that this realization finally did come, and, what is more important, that definite steps have been taken to solve the problem. Changes in curriculum such as those inaugurated in the College of Architecture last fall will be of tremendous influence in the future and will, perhaps, be the greatest single factor making for a brotherhood of the professions of architecture and civil engineering.

FOR ALMA MATER

Now and then, we hear something concerning a deed that an Alumnus has done in behalf of his Alma Mater. One recent instance like that has been shown in the return of three Alumni to build the chimney of the new heating plant. Two of them were graduates from the School of Civil Engineering; the third from Sibley. These men, Thomas S. Clark, C. E. '94, F. Barnard O'Connor, C. E. '13, and Howard C. Blackwell, M. E. '05, were given an opportunity to render some service to their Alma Mater and they took advantage of it. To them was given the joy of knowing that they were able to repay in part their debt to Cornell. As a reminder of this deed, and as an example for future Alumni to emulate, the two hundred and twenty-five foot chimney rises high into the air making a conspicuous appearance on Cornell's panorama.

A REMINDER

The students in the School of Civil Engineering have, for the last few years, been rather indifferent to the opportunity offered them by the Fuertes Memorial Prizes in Public Speaking. This contest, which results in awards of \$125, \$35, and \$20 respectively to the three leading contestants, is held each April. Of late, men from the C. E. School have not been among those three, the prizes having fallen into the hands of men from the School of Mechanical Engineering and the College of Architecture. This year should see at least one of those prizes captured by a student from this school. To bring that about, the Juniors and Seniors must begin to prepare for the contest now. Let us see a large turn-out of contestants. Remember that the prizes were donated by Charles H. Baker, C. E. '86. For that reason, it is especially desirable that men from the C. E. School be among the winners.

Diagrams for Reviewing Doubly Reinforced Concrete Beams

By

CHAS. E. O'ROURKE, C. E., '17

Instructor in Bridge Engineering, Cornell University

Many diagrams and tables have been prepared to simplify the work involved in solving the cumbersome equations for doubly reinforced beams. It is the purpose of this paper to submit diagrams which will give the values of the extreme fibre stress in concrete and the maximum unit stress in the tension steel in a beam with compressive reinforcement, the only computations involved being those for the bending moment and the steel ratios. They will be found especially useful in reviewing

$$(b) \quad M_c = \frac{1}{2}f_c k(1 - \frac{1}{3}k)bd^2 + f'_s p'bd(d - d')$$

It may also be shown* that

$$f_s \left(k - \frac{d'}{d} \right)$$

$$(c) \quad f'_s = \frac{1 - k}{1 - k}$$

$$(d) \quad k = \sqrt{2n \left(p + p' \frac{d'}{d} \right) + n^2(p + p')^2} - n(p + p')$$

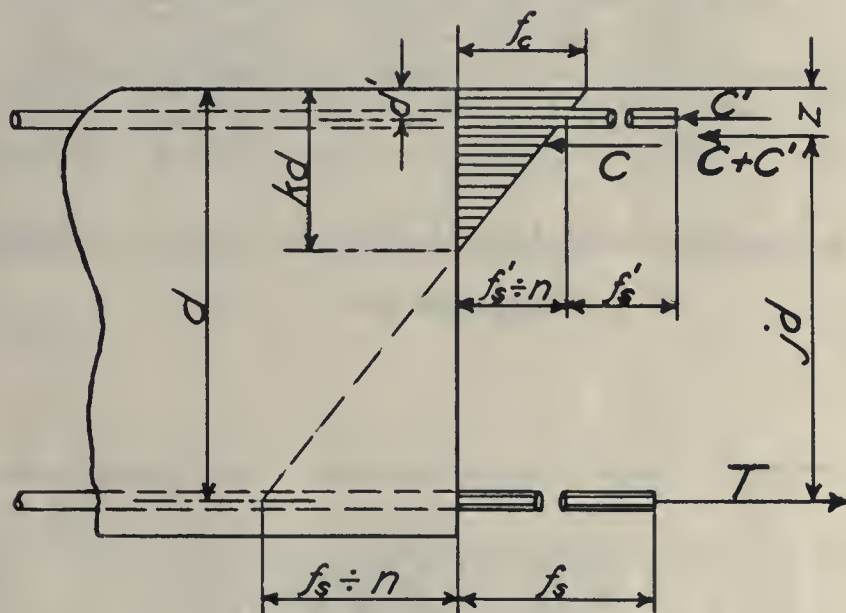


Fig. 1.

a continuous beam at the support; a problem involved in beam and girder floor design, in wall beam design, and other continuous beam problems.

Since in such beams the area of steel in top and bottom at the support is usually furnished by bending up some of the tension steel from the middle of the beam and continuing the rest straight through the support to assist in resisting compression at that point, and since the value of the effective depth, d , at the support is fixed by the depth used at midspan, it is merely necessary to investigate the stresses at the support and be assured that they are within safe and economical limits. The ratio of p'/p may be varied by bending up more or less of the longitudinal steel over the support.

From Figure 1, which represents a portion of a beam with compressive and tensile reinforcement, it may be seen that the resisting moment due to the tensile steel equals

$$(a) \quad M_u = A_s f_s j d = p f_s j b d^2$$

while that due to the concrete and compressive steel equals

$$k^2 - \frac{1}{3}k^3 + 2p'n \left(k - \frac{d'}{d} \right) \left(1 - \frac{d'}{d} \right)$$

$$(e) \quad j = \frac{k^2 + 2p'n \left(k - \frac{d'}{d} \right)}{k^2 - \frac{1}{3}k^3 + 2p'n \left(k - \frac{d'}{d} \right) \left(1 - \frac{d'}{d} \right)}$$

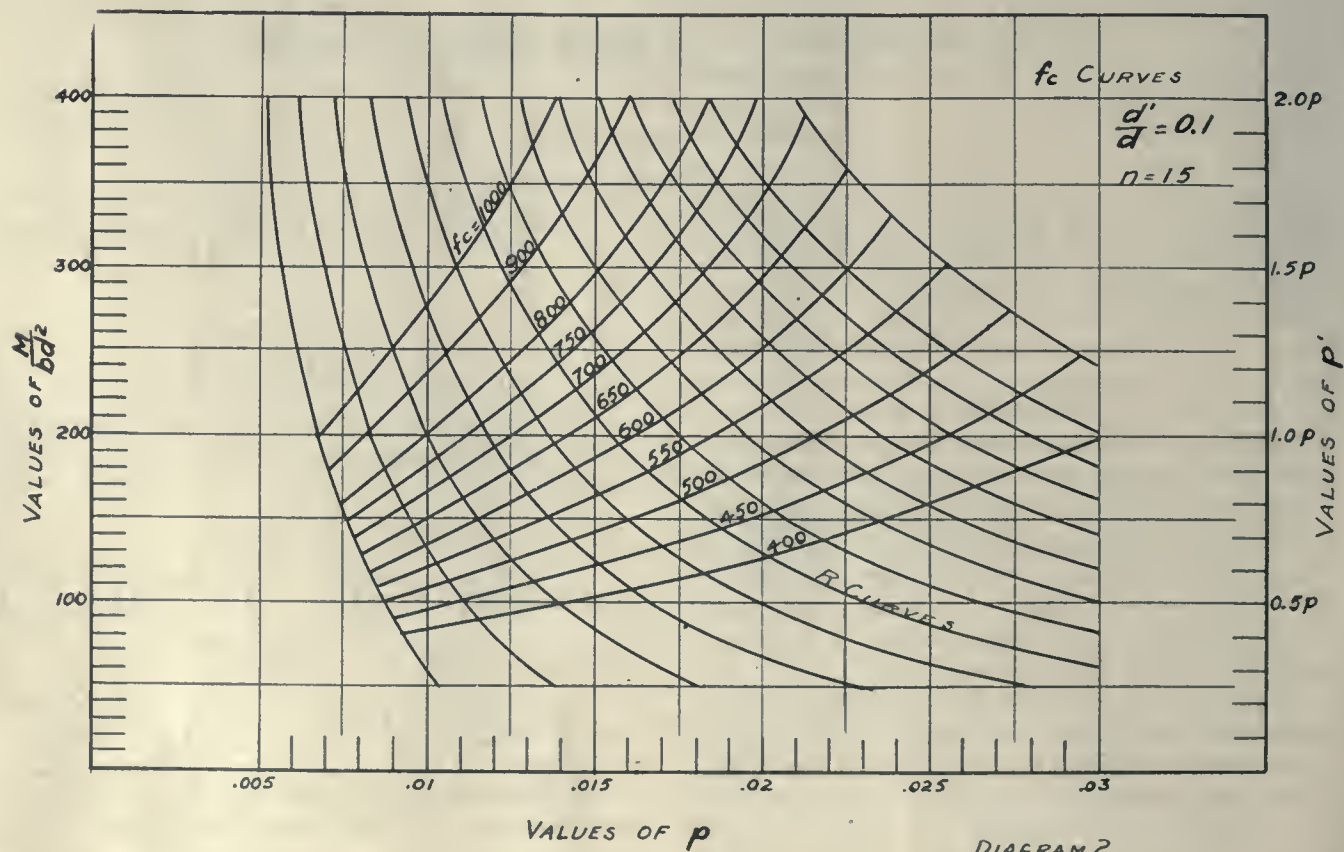
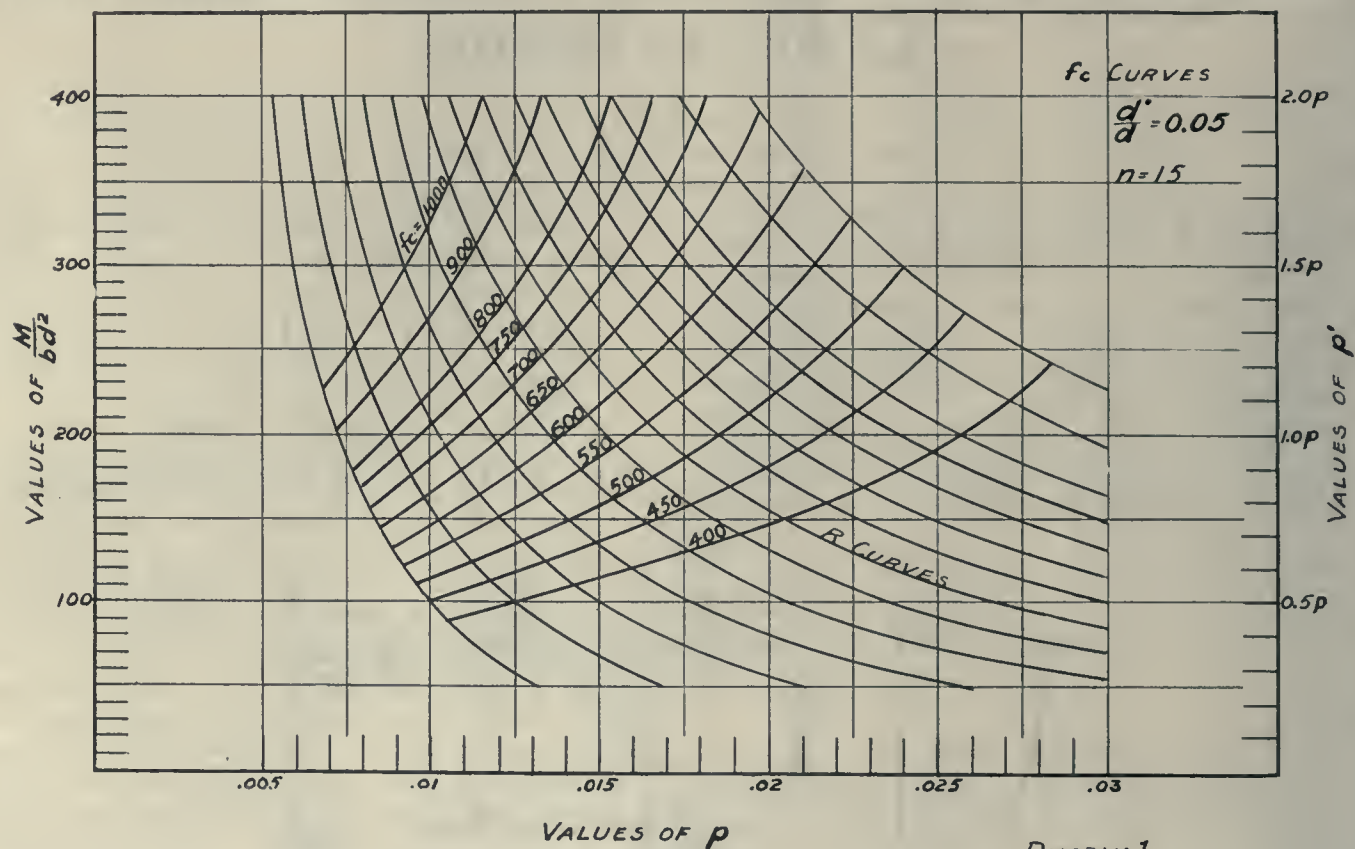
Substituting these values of f'_s and j in the resisting moment equations, the latter may be put in the form

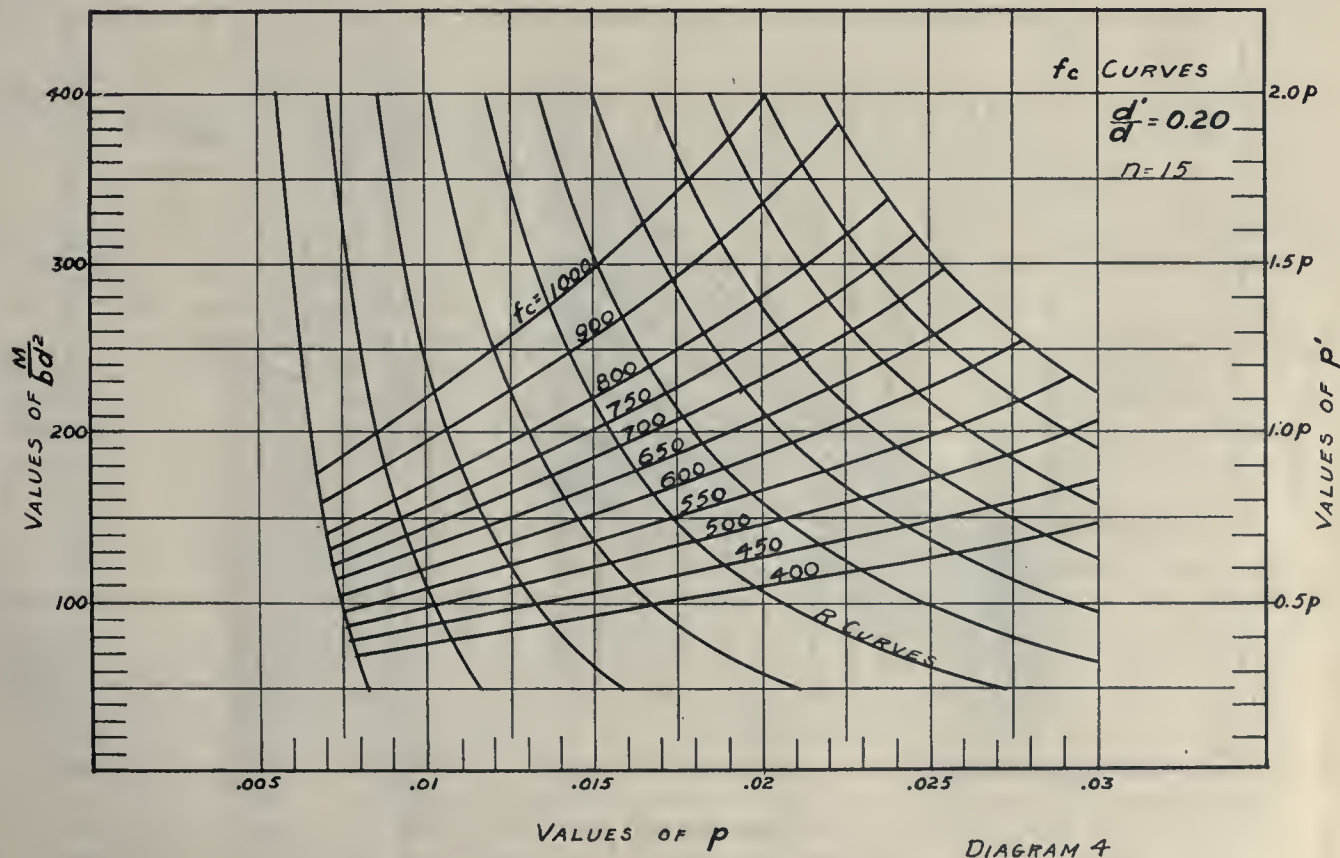
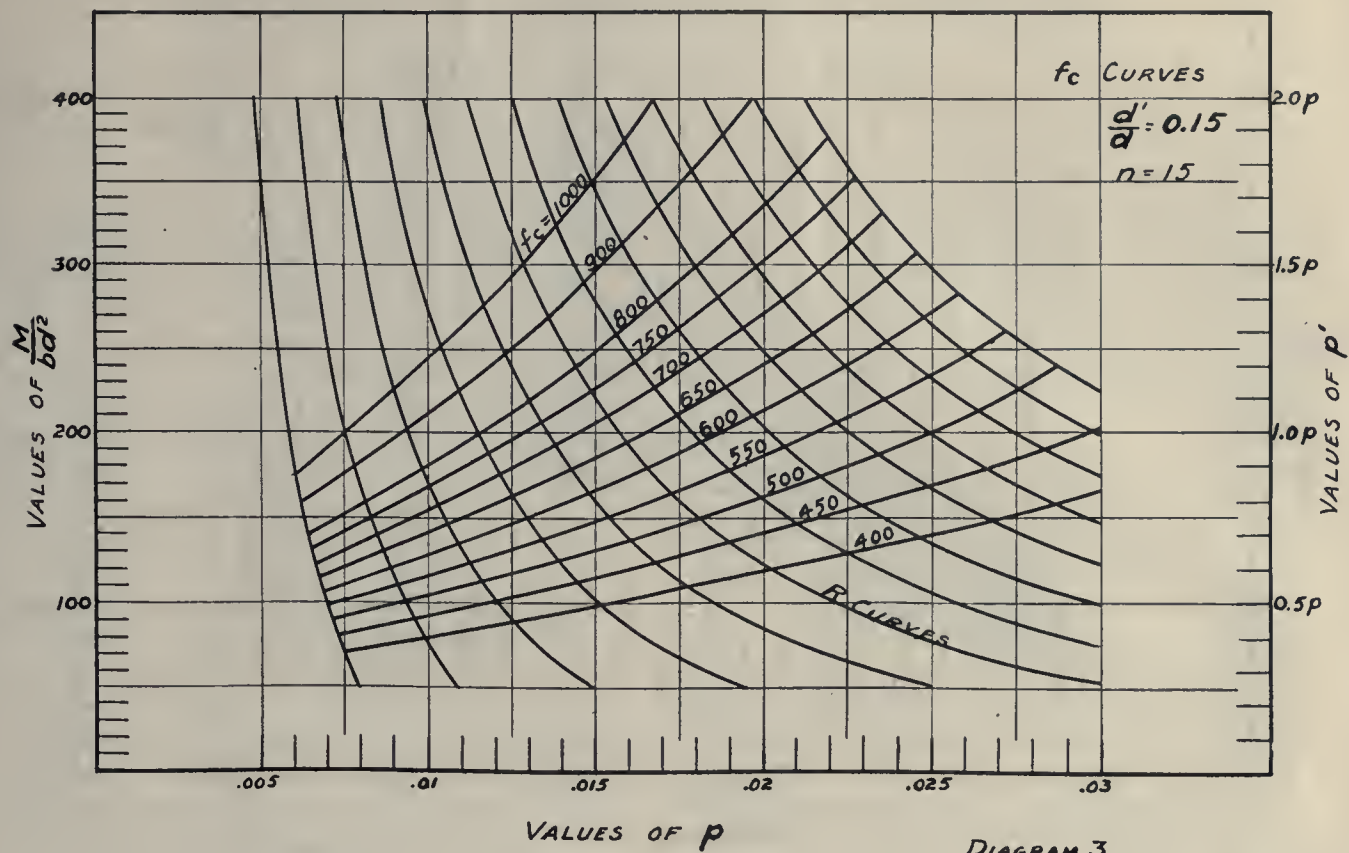
$$(1) \quad M_c = b d^2 f_c R \quad \text{in which} \quad R = \frac{k}{2} \left(1 - \frac{k}{3} \right) + \frac{n p'}{k} \left(k - \frac{d'}{d} \right) \left(1 - \frac{d'}{d} \right)$$

$$(2) \quad M_s = b d^2 f_s N \quad \text{in which} \quad N = p \left(1 - \frac{d'}{d} \right) - \frac{k^2}{2n(1-k)} \left(\frac{k}{3} - \frac{d'}{d} \right)$$

The values of the extreme fibre stress in concrete and maximum unit tensile stress in steel are then

* For the derivation of equations (c) to (e) refer to any recognized text on reinforced concrete.





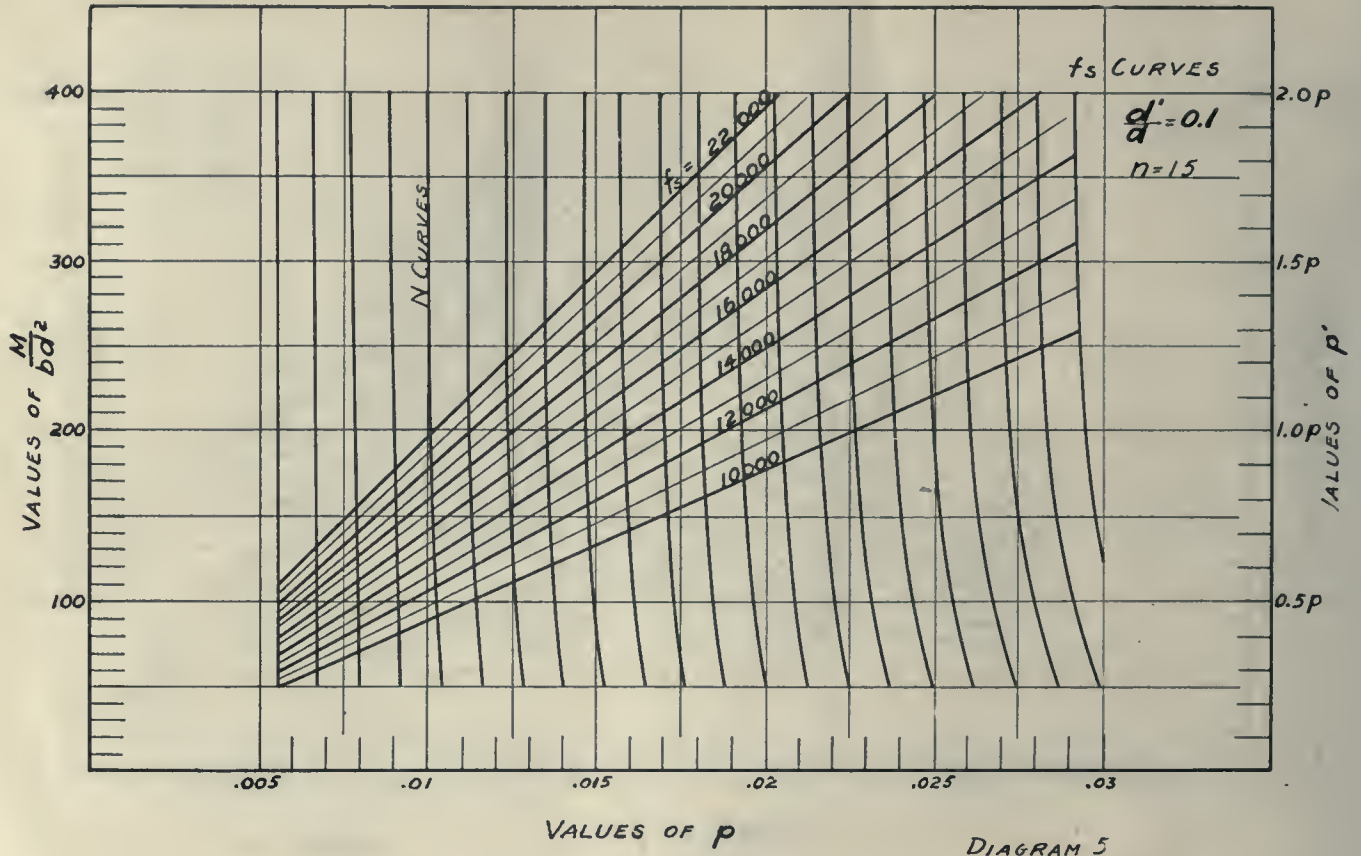


DIAGRAM 5

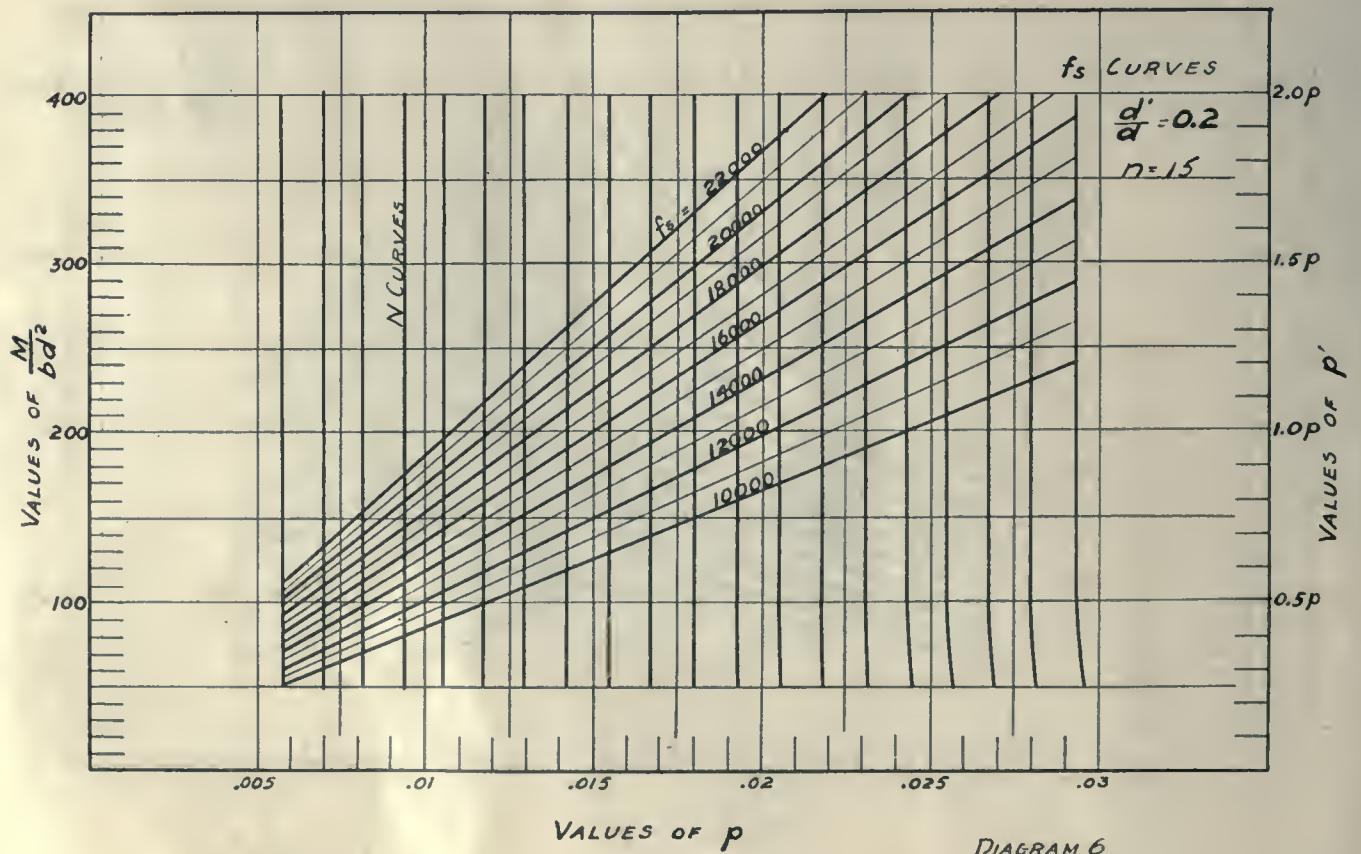


DIAGRAM 6

(Continued on page 49)

The Civil Engineer Corps of the United States Navy

By

LIEUT. (j. g.) R. E. BASSLER, (CEC), U. S. N., C. E. '17

The United States Navy may be likened to a large industrial corporation, the Navy Yards and Naval Stations being the shops and warehouses, and to carry the analogy still further, the fleet and its adjuncts being its salesmen visiting places which have need of its products. Naturally, the fleet is the U. S. Navy, and all shore establishments, personnel and material exist solely because of the fleet, and only to serve it. The need for an engineering body in any large organization is obvious, and constitutes the reason for the existence of a Civil Engineer Corps in the U. S. Navy. The necessity for placing the Corps in the Naval service is apparent when it is realized that each Civil Engineer is under military control, and a study of Naval organization confirms this necessity.

The Civil Engineer Corps functions in the Bureau of Yards and Docks, and the duties of that Bureau comprise the design and construction of the Public Works and Public Utilities of the Navy, and their repair, upkeep and operation, with a few exceptions. The term "Public Works" is construed to include the following: aqueducts, breakwaters, bridges, buildings, canals, chimneys, dams, dredging, docks, dry docks, harbor works, heating and ventilating plants, hospitals, magazines, paving, piers, quay walls, radio stations, railways, refrigerating plants, reservoirs, roads, sewers, storage tanks, and water works. The term "Public Utilities" is construed to include the following: cranes, derricks, dredges, fire apparatus, locomotives, pile drivers, steam shovels, telephone and telegraph lines, and vehicles.

As may be perceived, the duties call for a civil engineer of broad qualifications and training, and it is such civil engineers that the Navy Department endeavors to obtain through the exhaustive, professional entrance examinations. However, mechanical, electrical, and chemical engineers are eligible to take the examination, and since, in most instances, the candidate is given a choice of questions (and there are generally enough questions of a mechanical and electrical engineering nature distributed through the examination), it is possible for other than civil engineers to pass the examination by studying a few civil engineering subjects in addition.

The opportunity in the Civil Engineer Corps of the Navy for an engineer to broaden himself is second to none other in commercial life. In accordance with the policy of the Navy in general, no one man is so trained and encouraged to become a specialist that he cannot be replaced by other men in his particular branch. An officer, therefore, may be de-

tailed to any particular work for a period of several years and then ordered to another job which is generally entirely different but still naval civil engineering. For instance, at one yard, the work may be predominantly concrete construction; at a station, erection of radio towers, at a new station, mainly roads, sewers, dredging and the construction of piers and quay walls.

At the present time, in accordance with our Government's treaty with Haiti, there are eight members of the Civil Engineer Corps assigned to that country. Prior to 1915, engineering in Haiti was of the 1750 civilization, and it is now the duty of these engineers to bring Haiti up to the 20th century in engineering. The vastness of this project can be comprehended by giving the subject a little thought. For instance, the Haitian Government cannot afford to buy any extensive modern equipment to do the necessary engineering work. Furthermore, labor in that country is very cheap and extremely inefficient, rates of pay ranging from twenty to thirty cents a day. The laborers represent a semi-savage state of civilization, and are of a low order of intellect. In view of labor's inefficiency et cetera, it probably costs as much to accomplish a given piece of work in Haiti as it does in the United States, that is, one needs many times the same number of men to accomplish the job as one would need in this country. It is therefore necessary to devise ingenious improvements on primitive methods in order to accomplish the necessary work, the obstacles taxing the resourcefulness of the naval civil engineers in that country under the direction of the Engineer-in-Chief, Commander A. L. Parsons, (CEC), U. S. N.

Another instance of the diversified duty encountered by officers of the Civil Engineer Corps may be cited in connection with the Knickerbocker Theater disaster which occurred in the early part of 1922 in Washington, D. C. Many investigations were started, and finally Commander George A. McKay, (CEC), U. S. N., and Messrs. Joseph Michaelson, C. E., '92, and R. F. Bessey of the Bureau of Yards and Docks, and two Army engineers were appointed as members of an investigating board. The board's report was submitted several weeks later, and was used by the district attorney in the trial of the individuals considered responsible for the disaster.

In obtaining officers for the Civil Engineer Corps as it does, the Navy secures a very broadly trained body of engineers, coming as they do from all the leading universities of the United States. At the present time the 106 members of the Corps are re-

cruited from 35 different universities, 16 officers being from Massachusetts Institute of Technology, 11 from Rensselaer Polytechnic, 8 from Cornell, and 13 Naval Academy graduates who have taken a post graduate course at Rensselaer. 19 universities have contributed one member to the Corps each, and 5 two each.

Within the Civil Engineer Corps roster can be found names of national renown such as Rear Admiral Robert E. Peary, C. E. C., U. S. N., who discovered the North Pole; Rear Admiral Mordecai T. Endicott, who was President of the Am. Soc. C. E. in 1911, father of floating steel dry docks in the Navy, leader for the fight for the masonry dry docks instead of timber dry docks, and who probably advanced civil engineering in the Navy more than any other one man; Rear Admiral Harry H. Rousseau, who was advanced to his present rank by a special act of Congress in recognition of his work as a member of the Isthmian Canal Commission building the Panama Canal; Rear Admiral Frederic R. Harris, a noted authority on dry docks, wharves, docks, piers and quay walls; Captain Frank T. Chambers, one of the foremost authorities in the United States on ports and terminals, and others.

The official connection of civil engineers with the Navy dates back to an early period of the country's history; the growth of the civil engineering force into a commissioned corps of its present strength has been a gradual development.

President Jefferson, years before the Bureau of Yards and Docks was established or the corps organized, favored the construction of a huge dry dock capable of accommodating 12 frigates. At that time ships of the line were built of wood, and were very small compared with present-day ships. Jefferson's idea was to have a tidewater basin from which ships could be raised by locks to an upper basin, 24 feet higher, which was to be 800 feet long and 175 feet wide. After the water was drained out of it, the ships would be left high and dry. Benjamin Henry Latrobe was called in as consultant and he considered it feasible and executed the drawings, but no appropriation could be obtained for the project.

The connection of Latrobe, an eminent civil engineer, with a naval shore project as outlined above indicated the essential relation between fleet and land construction which has since continually grown closer.

The next notable instance of a similar character occurred within the period of administration of the Board of Naval Commissioners, with the employment of Loammi Baldwin, Jr., on the construction of the dry docks at Charlestown (Boston), Mass., and Gosport (Norfolk), Va. Born in Massachusetts in 1780, the third son of a colonel in the Continental Army who was himself an engineer of repute, Loammi Baldwin numbered among his early works a note-

worthy dam on the Union Canal in Pennsylvania, the construction of the Bunker Hill Monument and the Boston water supply system. The Boston and Norfolk dry docks, the great works of his life, were built concurrently from identical plans during the years 1827 to 1834. His assistants were Capt. Alexander Parris and W. P. S. Sanger at Boston and Norfolk respectively. The two docks thus built are still in commission, unexcelled examples of their era. In addition to this work, Baldwin was engaged to examine the various navy yards and form plans for their future development, and he made surveys of New York Harbor to determine the best location for a dry dock.

The administration of the Board of Naval Commissioners was superseded by the bureau system by authority of law in 1842. Only five bureaus were at first provided for, the first to be named being a "Bureau of Navy Yards and Docks". The personnel of the first force of this bureau included W. P. S. Sanger as "Civil Engineer", the same Sanger who was Baldwin's pupil and assistant in the construction of the Norfolk Dry Dock.

It was not long until civil engineers, attached to the Bureau of Yards and Docks, were regularly employed at the various yards as well, and in 1858 a series of rules was drawn up for their regulation and guidance. These rules defined the duties of the Civil Engineer very much as they have existed to the present time. Until 1867 the civil engineers of the Navy retained a strictly civilian status, but in that year Congress passed a law providing that the President might appoint the civil engineers, such appointment to be confirmed by the Senate. This act made the civil engineer a staff officer. Four years later Congress provided that civil engineers should be given such rank as the President might fix, and limited their number to 10.

The first civil engineers to be commissioned under the act of 1867 were: W. P. S. Sanger, F. C. Prindle, B. F. Chandler, F. A. Stratton, and Charles Hastings. On account of his seniority in service, linking back into the beginnings of the Navy, W. P. S. Sanger may be justifiably considered the first civil engineer of the Navy.

The strength of the Corps remained fixed at 10 until long after the close of the Civil War, the period from 1867 to 1883 being one of pronounced naval inactivity, not to say stagnation. At the outbreak of the Spanish-American War, however, the number of civil engineers was increased to 18 through discretionary powers vested in President McKinley. Further increases were secured through the efforts of Rear Admiral Mordecai T. Endicott, who was chief of the bureau from April 4, 1898, to January 5, 1907. The small corps of 18 was wholly inadequate to the requirements of an expanding navy, and an increase to 40 (28 civil engineers and 12 assistant

civil engineers) was authorized by act of Congress on March 3, 1903.

Rear Admiral Endicott was succeeded as chief of the bureau by Rear Admiral H. H. Rousseau, who was selected as a Commissioner of the Panama Canal less than three months after his appointment. Rear Admiral R. C. Hollyday served as chief four years and nine months from March 26, 1907. Under his administration the consolidation of all public works of the Navy under the Bureau of Yards and Docks was accomplished.

Rear Admiral H. R. Stanford took office on January 14, 1912, and served as chief of the bureau four years. Rear Admiral F. R. Harris was appointed January 14, 1916. His administration embraced the opening period of the World War, and was marked by an unprecedented expansion of the bureau's activities. He resigned to become general manager of the Emergency Fleet Corporation, and was succeeded by Rear Admiral Charles W. Parks, who carried on the great volume of war work, served four years and was retired in December, 1921. The present chief of bureau, Rear Admiral Luther E. Gregory, was nominated by President Harding, December 20, 1921. Capt. R. E. Bakenhus is the present assistant chief of bureau.

With regard to the examination, each candidate undergoes a preliminary examination as to general fitness, which is based on his collegiate record, testimonials, references, and professional experience. Candidates are not assembled for this preliminary examination but submit their papers by mail. Candidates passing the preliminary examination are selected to take the written examination held at designated locations. Immediately preceding the written examination, a physical examination is conducted by a board of Naval Medical Officers. The professional examination is open only to those who have passed the preliminary and physical examinations. The general requirements are age, 22 to 30 years, 20 months practical professional experience subsequent to graduation, and a degree in engineering from a college or university of approved standing. The professional examination is exhaustive, and covers five days of 7 hours each, or six days of 6 hours each. The different subjects that one is examined in, are as follows:

1. Mechanics of engineering.
2. The theory of structures.
3. Field engineering, including surveying, use and adjustment of instruments.
4. Steam and electrical engineering.
5. The materials of construction.
6. Specifications and inspection.
7. Design and construction, water-front structures and foundations.
8. Estimating.
9. Design and construction, water supply and sewerage systems and sewage disposal.

10. Design and construction, railroads and high-way engineering.
11. Engineering thesis and general information.
12. Design and construction, earthwork, retaining walls, and reinforced concrete.

If successful, the candidate enters the Corps as Assistant Civil Engineer with rank of Lieutenant, Junior Grade, and is advanced to higher ranks with his running mate in the line. The minimum pay of a Lieutenant, J. G., is \$3,158 per annum, with increases of \$100 per annum for each three years of service. In normal times, a promotion to the rank of Lieutenant occurs in about three or four years, this rank carrying with it a total minimum annual pay of \$3,798, with increases of \$120 per annum for each three years of total service. Under the new pay schedule, military officers are granted increases on length of service. In view of this fact, a man should not hesitate to enter the service merely because he assumes the Navy will stand still in the years to come. With regard to the Disarmament question, it is well to point out that conditions existing as they do in the world today, the United States requires the same defense against aggression that it always has had. We, as a nation are more to be envied than ever before. The Navy, like all other Government Departments, is suffering at the present time from the wave of economy. Movements to eliminate waste and conserve resources are always worthy, but should always be far-sighted. Getting back to the Navy again, as Rear Admiral J. K. Robison, U. S. N., Engineering Chief of the Navy, said before the Michigan Banker's Association: "Great armies, great navies or great guns do not ail the world. These are but symptoms. The underlying causes of war lie in economic competition, the unequal distribution of raw materials, the unequal distribution of population, the helplessness of potentially rich countries, and racial hatreds. Burglaries are not caused by the existence of burglars' tools. The tools exist because there are burglars. When the burglar reforms, you will find his tools on the scrap heap, but no one ever reformed a burglar by taking away any or all of his tools".

FACULTY NOTES

Prof. C. L. Walker '04, of the Sanitary Engineering Department, spent several days of October in the middle west. He was in Minneapolis from October 9 to 11 and addressed the International Milk Dealers Association, held in connection with the National Dairy Show, on "Some Recent Studies in Dairy Wastes Disposal". Also he gave a talk before the Department of Entomology of the University of Minnesota on "The Oxygen Requirements of Fish Life".

On the 12th he had the opportunity of visiting the Sewage Disposal Plant of Milwaukee just now under

(Continued on page 47)



SCHOOL NOTES

CHAPTER MEETING

The A. S. C. E., student chapter, held its December meeting on the 4th at the Sibley Dog. President Spurney opened the meeting; and confessed that he had secured some prominent men to speak for the next three meetings. He gave out the shingles awarded to the members of the soccer team.

A. W. Crouch, chairman of the entertainment committee, then took charge of the meeting. He introduced R. M. Madrigal, C. E. '25, of the Philippine Islands, who rendered the piano selection, The Filipino Cornelian, a pleasing march, composed by Mr. Madrigal, himself. Three foreign students each gave short but highly interesting and instructive talks on the dangers and the opportunities awaiting American engineers in their respective countries. H. R. Buenano, '23, spoke for South America, V. G. Burmistroff, '23, for Russia, and I. P. Fang, '23, for China. These three talks each brought forth the fact that an American engineer, who expects to practice in a foreign country, can gain much valuable information, by conversing with students in the University who live in that country.

The meeting then adjourned to Sibley Dome to view two reels of moving pictures of "The Story of Water" obtained from the U. S. Geological Survey through the courtesy of Prof. Seery. After the pictures, all who were hungry went back to the Dog to partake of the refreshments before leaving.

PROMINENT SPEAKERS FOR STUDENT CHAPTER MEETINGS

The student chapter, A. S. C. E., is very fortunate in having secured the promise of the following men to speak at some one of the coming meetings. The men are as follows:

Mr. L. W. Wallace of Washington, D. C., who is

executive secretary of the American Federated Engineering Societies.

Mr. John H. Dunlap, of New York City, now secretary of the American Society of Civil Engineers.

Mr. George S. Frank, C. E. '11, of Ithaca, who is manager of purchases for Cornell University.

These men will be doing us a great favor by coming here to speak to our Student Chapter and every C. E. should make it a point to be at the meetings and profit by the opportunity of hearing these men.

SOCCER SHINGLES AWARDED

The members of the C. E. soccer team for the 1922 season were awarded shingles at the December meeting of the student chapter, A. S. C. E.

From the 22 men who tried out for the games these twelve were selected as being most worthy of receiving the C. E. shingle. The men were as follows: P. F. Beaver '24, J. Bevaqua '24, H. R. Buenano '23, S. L. Chan '24, A. W. Crouch '23, J. J. Delhourgo '24, E. W. Downs '23, T. L. Kanasut '26, W. T. Kwong '26, W. Petrillo '25, F. L. Thompson '24.

FACULTY NOTES

(Continued from page 46)

construction on Jones Island. This plant will use the activated sludge method. The next day he inspected the experimental sewage plant at Argo, Illinois, and the recently opened activated sludge plant at Maywood which is operated by the Sanitary Department of Chicago.

Prof. E. W. Schoder '03, professor of Experimental Hydraulics, spent several days in Chicago during the last of November, acting as an expert witness, on a lawsuit concerning the Illinois River.

ALUMNI NOTES

The Committee on Pile Driving Records, at the meeting of the American Bridge and Building Association held in Cincinnati, Ohio, October 17 to 19, made a report which contained quotations of several articles from Jacoby and Davis' text book on Foundations of Bridges and Buildings. It included the articles on the Engineering News pile-driving formula, and in the practical limitations of the terms composing it.

'99. Professor C. C. More of the University of Washington has been transferred to a member in the American Society of Civil Engineers.

'05. G. E. McCurdy, formerly manager of the Akron, Ohio, branch of the Morris Knowles Engineering Company, Inc., has formed a partnership with E. D. Barstow to conduct an engineering business at Akron. His address is 316 Wildwood Ave., Akron, Ohio.

'05. James C. F. Shafer has opened an office at 400 Erie Building, Cleveland, Ohio, for the business of constructing industrial plants. His experience has been developed by work in this line during the past ten years.

'08, M. C. E. '09. A son, Ralph Aleorn, Jr., was born on October 1 to Mr. and Mrs. Ralph A. Smallman of Birmingham, Ala. Smallman is Vice-President and Treasurer of the Smallman, Brice Construction Company, Inc., at 1109 Avenue E.

'09. Ralph M. Bowman is Assistant Purchasing Agent with the Otis Steel Company. His residence is at 15000 Euclid Ave., Cleveland, O.

'09. Otto F. Briede, Jr., is operating a Wagon and Truck Body Factory at 416 Girod St., New Orleans, La. He resides in Waveland, Miss.

'09. Vance L. Richmond, Captain of Infantry, is in Fort Benning, Ga., taking a course in the Infantry School.

'10. W. E. Day is construction manager on a new power transmission line between Badin and Sanford, N. C. His address is in care of the Phoenix Utility Company, Albermarle, N. C.

'11. C. P. Rhyans is with the W. J. Sherman Company of which W. J. Sherman '77 is president, at 302 Produce Exchange Building, Toledo, O.

'14, '17. Captain and Mrs. Gilbert E. Parker announce the birth of their daughter, Virginia Sturtevant, on September 20, in Washington, D. C. Parker is stationed at the Infantry Tank School, Camp Meade, Md.

'14. George G. Robinson is with the Jno. E. Russell Company, Ltd., at 504 Harbor Administration Building, Toronto, Ontario, Canada, general sales agents for cement, crushed stone, washed sand and gravel, sewer pipe, brick and builders' supplies. His

address is 16 Summerhill Gardens, Toronto.

'15. Lieut. Henry G. Lehrbach, C. E. C., U. S. N., has severed connections with the Civil Engineering Corps and the Navy. Up to the time of his resignation, he was located at the San Diego, California, Naval Operating Base.

'15, '20. Alan F. Williams '15, is captain of the Olympic Club football team; Leo Von Heygendorf '20, plays end on the same team. Williams' address is Box 144, Sausalita, Cal.

'16. Fred C. Brandes is transitman for the City of White Plains. He resides on Mamaroneck Road, White Plains, N. Y.

'16. Henry A. Foster, who, for the past two years, has been engaged in water power investigations in the office of Col. William B. Parsons, 84 Pine St., N. Y. C., has lately returned to the office of Dwight P. Robinson and Company, Grand Central Palace, N. Y. C., where he will resume his work of structural designing. His residence is at 205 Garfield Place, So. Orange, N. J.

'17, '18. Aram H. Dimijan, civil engineer for the State of Alabama, is now directing construction at state institutions in that state. His address is 1108 S. Thirteenth St., Birmingham, Ala.

'17. A son, Ellsworth Fisher, was born on August 22 to Mr. and Mrs. Ellsworth L. Filby of 1319 Bull Street, Columbia, S. C. Filby is sanitary engineer with the State Board of Health of South Carolina.

'17. "Gabe" Lund has returned to Cuba and is Division Engineer of the Tanamo Division of the Atlantic Fruit Company. His address is in care of this company at Cayo Mambi, Oriente, Cuba.

'18. A son, Robert Emmett, was born at Chicago on October 12 to Mr. and Mrs. Ross W. McKinstry of 101 Fourth St., Hinsdale, Ill. McKinstry is structural engineer at 5131 Kimbark Ave., Chicago.

'19, '20. Robert B. Bowles is engineer for the Central Contracting Company at 520 West Building, Houston, Texas. His home address is 305 Avondale Ave., Houston.

'19. John H. McClure is resident engineer for the Pittsburgh-Des Moines Steel Company in Panama, Canal Zone, in charge of work for the U. S. Navy and other contracts. His mail address is Box 1014, Cristobal, Canal Zone.

'19, '22. Thomas C. McDermott is field engineer with the Fred T. Ley Construction Company which is constructing the new Chemistry Building on the Campus.

'19. Mrs. Sallie Wilson announces the marriage of her daughter, Ora Kathryn, to Homer R. Seely, '19, on Thursday, November 30. Seely was a member of the Board of the Cornell Civil Engineer when

he was in college. At present, he is resident engineer for the Bethlehem Steel Corporation at Steelton, Pa.

'19. "Ducky" Waldo is a Project Engineer in the construction department of the State Highway Department of Missouri.

'21. James H. Cheston is civil engineer with his office at Conowingo, Md. His home address is 89 Bruce Ave., Yonkers, N. Y.

'21. Waldemar Polaek is in the engineering department of the New York office of Paul J. Kalman of Chicago. He lives at 515 W. 177 St., N. Y. C. His father, Herrmann Polaek, died suddenly on September 26 of heart failure.

'22. H. G. Brown is junior engineer in the City Engineer's office of East Orange, N. J. He lives at 32 N. Arlington Ave., East Orange.

'22. Cornelius C. Crusel is with the Standard Oil Company of Louisiana. His address is in care of the company, Box 128, Homer, La.

'22. Abraham Josefson is in the drafting office of the American Bridge Company in Elmira, N. Y. His residence is at 323 West Church St., Elmira.

CHANGES OF ADDRESS

- '94 A. H. Place—from Blissfield, Mich., to 317 Jefferson Ave., E., Detroit, Mich.
- '01 W. C. Affeld—from 2725 Colfas Ave., So., to 1398 Minnehaha Parkway, Minneapolis, Minn.
- '01 C. L. Hartwell—from c/o I. E. Hartwell to 509 Miners Bank Building, Wilkes Barre, Pa.
- '04 N. J. Bell—from 1014 Redfern Ave., to 760 Kenilworth Ave., Dayton, Ohio.
- '05 J. C. F. Shafer—from 6110 Euclid Ave., to 400 Erie Building, Cleveland, Ohio.
- '07 A. W. King—from 108 E. Moreland Ave., Chestnut Hill, Philadelphia, Pa., to 2 Girard Place, Maplewood, N. J.
- '09 R. W. Clark—from 11 Woodlawn Terrace, to 12 Sterling St., Waterbury, Conn.
- '13 L. R. Gons—from 24 Milk St., Boston, Mass., to 19 W. 44 St., New York City.
- '13 R. D. Welsh—from Patton, Pa., to 4126 Forest Park Ave., Baltimore, Md.
- '14 W. H. Hanchett—from Box 492, Miles City, Mont., to 42 Adams St., Buckport, N. Y.
- '14 C. L. Maas—from 5848 Florence Ave., Philadelphia, Pa., to 315 Yale Ave., Swarthmore, Pa.
- '14 Christian Schwartz—new address—Box K North End Station, Detroit, Mich.
- '15 Julius Sobel—from 135 Vernon Ave., to 702 Eastern Parkway, Brooklyn, N. Y.
- '17 W. L. Saunders—from 1323 Columbia Rd., to 4139 New Hampshire Ave., Washington, D. C.
- '18 A. H. Dimijan—from Ithaca, N. Y., to 1108 S. Thirteenth St., Birmingham, Ala.
- Ex '19 Lieut. R. L. Milliman—new address—5519 Victor St., Dallas, Texas.

DIAGRAMS FOR REVIEWING DOUBLY REINFORCED CONCRETE BEAMS

(Continued from page 43)

$$(3) \quad f_c = \frac{M}{bd^2} \cdot \frac{1}{R} \qquad (4) \quad f_s = \frac{M}{bd^2} \cdot \frac{1}{N}$$

Diagrams 1-6 give values of R and N for different values of p and p' , and also f_c and f_s for various values of M/bd^2 , k having been determined from equation (d). The procedure to be followed in using these diagrams is to first determine p and p' ; then enter the proper diagram (this depends on d'/d) with the computed values of p and the ratio p'/p , the intersection of which determines R (or N); follow along the R (or N) curve thus located, to the intersection with a horizontal line through the existing value of M/bd^2 ; the value of f_c (or f_s) may then be read directly from the curve, interpolating if necessary. The numerical values of R and N are unnecessary to the solution of the problem and are therefore omitted from the curves. The error involved in using the diagram for d'/d next above the actual value will be small and on the side of safety. Such procedure is recommended because of the simplification of the work.

In the diagram giving values of f_s for d'/d equal to 0.2, the effect of the ratio p'/p is negligible as is evidenced by the fact that the N curves are vertical. For this reason it is possible to enter this one diagram with values of p and M/bd^2 and get f_s directly. The result will be the same as that obtained by following the usual procedure given above.

Illustrative Problem

A typical beam in a reinforced concrete floor of the beam and girder type has an effective depth of 25.5 inches, a width of stem of 12 inches, and reinforcement consisting of four one-inch square bars in one row, the center of which is 2.5 inches above the lower surface of the beam. One half of the bars are bent up over the support to provide for negative moment and the other half continued straight through the support to assist in resisting compressive stresses at that point. The maximum moment in the beam equals 1,500,000 inch-pounds. What are the values of f_s and f_c at the support?

$$\begin{aligned} p &= p' = \frac{4.0}{12 \times 25.5} = .0131 \\ d' &= \frac{2.5}{25.5} = .098 \\ M &= \frac{1,500,000}{bd^2 \cdot 12 \times (25.5)^2} = 192. \end{aligned}$$

Entering Diagram 2 with $p = .0131$ and $p' = p$ and following the R curve thus determined to the intersection with a horizontal line through the value of $M/bd^2 = 192$, it is found that

$$f_c = 650 \text{ lbs. per sq. in.}$$

Similarly from Diagram 5

$$f_s = 16,600 \text{ lbs. per sq. in.}$$

CORRECTION

We are very sorry indeed to report that in Mr. Engel's article on "Stresses in a Roof Truss" which was published in our November, 1922 issue there appeared an error in the arrangement of paragraphs in the right hand column of page 19. Starting at the top this whole column should read:

After plotting the loads and reactions as shown in figure two, we begin at the point of contra-flexure of the left hand column and continue the stress diagram taking members counter-clockwise. At the fourth panel point of the top chords we encounter three unknown stresses, but this can be solved easily by computing the stress in **HJ** taking moments about the peak of the truss and then finding the stress in **hg** graphically in the stress diagram.

The members shown by dot and dash lines have no stress due to wind when the wind is blowing from the left.

When the auxiliary members are removed, the stresses in the columns must be revised as the stress in the section below the knee brace, is equal to the vertical component of the reaction and the stress diagram for the joint at foot of knee brace will not close as there is bending in the column at that point.

DINNER FOR ENGINEERING ALUMNI

The Cornell Society of Engineers is already making arrangements for its annual dinner, which will be held January 19th, 1923. This is Friday night of the week in which the American Society of Civil Engineers holds its annual meeting in New York City. G

The place selected will probably be the Machinery Club, 50 Church St., where several meetings have been held in the past. Since the membership is now 70 per cent larger than it was in 1920, the committee is out to smash all previous records with an attendance of five or six hundred. For sixteen years the big dinner, or reunion, has been the principal event of the year for the Alumni Engineers' Society and the Seventeenth Annual Dinner will undoubtedly be "bigger and better than ever".

The Dinner Committee consists of: Ernest A. Truran '95, chairman; John W. Ripley '93; Clyde Potts '01; James E. Davidson '09; Harold H. Williams '09; Ralph E. Chapman '11; Phillip T. Coffey '14; Russell T. Tree '14; Eugene F. Zeiner '20, and Donald J. Cockroft '21.

C. E. LEADS COLLEGES IN BASKETBALL LEAGUE

The standing of the teams in the Intercollege Basketball League to date is as follows:

	W.	L.
C. E.	2	0
M. E.	1	0
Arts.	1	0
Vet.	1	0
Chem.	0	1
Ag.	0	1
Law	0	2
Arch.	0	1

C. E. has started off with dash and spirit. Let's keep up the pace!

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FEBRUARY, 1923



THE JOHNNY PARSON CLUB HOUSE

The Minor Sports Council passed the following resolution with reference to the new winter sports house:

"Resolved, That the club house erected on Beebe Lake for the encouragement of winter sports be named 'The Johnny Parson Club' as evidence of grateful and affectionate regard for Prof. John T. Parson through whose vision, enthusiasm and persistent effort, Beebe Lake was first used and later developed as a home for winter sports to the lasting benefit of many generations of Cornell undergraduates."

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EDITORIALS

STUDENT CHAPTERS OF THE A. S. C. E.

Quite recently, in drafting a new Constitution of the A. S. C. E., the Directors took especial pains to authorize and encourage the formation of Student Chapters. The system of Chapters thus instituted serves the important function of acting as a connecting link between the Society and the undergraduate engineers. This movement has proven in all ways a great success. There are now fifty-three Student Chapters affiliated with the Society, comprising a total membership during the past year of 3184.

By the courtesy of Mr. John H. Dunlap, Secretary of the Society, we have on hand a copy of Article V of the A. S. C. E. By-laws, which is devoted entirely to the nature and work of Student Chapters. The following extracts will be of interest to civil engineering students in showing the attitude of the Society in its connection with undergraduates:

"It is intended that each Student Chapter shall control the occurrence and character of its own meetings, but the American Society of Civil Engineers desires especially to aid in promoting the success and value of Student Chapters by frequent consultations and advice, as well as by arranging for speakers, on request, whose addresses will broadly supplement the class-work of the members."

The Society pledges in every way its help in advancing the interests of the Chapters. Among the privileges offered to members are:

"The right to attend the meetings and accompany inspection trips and excursions arranged for the American Society of Civil Engineers."

The use of official stationery.

A membership card signed by the Secretary and the right to wear a badge of special design.

"Provision for the publication of requests for summer employment during the college course, or for permanent engagement after graduation."

Students should not fail to take advantage of the opportunity offered by student chapters of the A. S. C. E. We feel that those who fail to profit by such decided advantages are losing part of the intangibles that form the better half of college life.

IS CONTRACTING A GAMBLE?

While working during the summer, we were surprised to hear an expression used very often by the contractor's foreman, to wit: "Well, let it go, it's all a gamble anyway". If we ever asked the specific question, "Do you think you'll make any money on this job?" (a small street grading contract) the

inevitable answer was, "I don't know, it's all a gamble."

Why should modern engineering contracting be a gamble? It is to be expected that for the "old school" contractor, a man who rose up from the ranks of laborer, bricklayer or carpenter, contracting should be more or less of a gamble. But today, when the old-fashioned contractor is being superseded by the more modern, by the trained engineer who has commenced applying his rational and engineering methods in the attempt to solve some of the perplexing problems of contracting, there is no reason in the world why this field should be a great financial hazard or even to be regarded as such.

Conditions in the contracting profession are improving all the while. But they do not seem to keep pace with the rapid progress in the other branches of engineering. The main reason for this lack of development in contracting lies in the dearth of accurate cost data. When the tremendous amount of construction work being carried on in this country is compared with the amount of published reports on costs, it is found that the cost data are surprisingly small. However, due to the fact that estimating is based on such constantly changing variables as price of labor and materials, there should be several times the information published on costs that there is published on design or construction where the items entering into the computations are more standardized and more nearly constant.

Let us assume that conditions become so ideal in the contracting field that there are more than enough cost data published. Despite this assumption, the problem would not yet be totally solved. After cost data are published, then what? Suppose they are sufficiently accurate. Who is going to interpret them exactly? Each job is just a little different from every other. Prices are shifting all the time. What allowances are to be made for these varying factors? And by whom? We realize that some very complicated problems are here presented for solution. But we maintain that these problems can be solved, and that by the solution of the cost data problem much can be done to put the profession of contracting on a firmer business foundation.

The contractor who is hardest hit by the present deplorable state of affairs belongs to the class which does the bulk of this country's construction work: the so-called small, independent contractor. The large national contracting corporations have well trained cost accountants and have their years of experience upon which to rely in making estimates. Although these large companies are well able to take care of themselves, they too would be benefited by an improvement in conditions. The small contractor must look toward his national trade associations to help him out of his difficulty. The organization which can be of greatest assistance and which is doing all in its power to improve matters is the Associated General Contractors, Inc. Every effort should rightly be put forward by it and by every other contractors association so that within a few years a vehement "No" might be the answer to the question "Is contracting a gamble?"

NEW FIELDS TO CONQUER

It is repetition to state that "the engineer is slowly coming into his own", but with new proof daily becoming evident in support of the statement, we feel that the repetition is justified.

The engineer becomes a valuable man in any enterprise when it is realized that his training has been to "construct safely at minimum cost". The manufacturer must "produce wisely at minimum cost", and in the two phrases just stated, "construction" and "production" are, in a general way, synonymous. This states the usefulness and value of the engineer in modern industry only in a general sense, however his value in specific instances is becoming more and more apparent.

The countless executive positions created by our modern form of economic control are successfully filled in many cases by an engineer. What more efficient personage could be found to dictate the policies of an enterprise than one who has harnessed and applied the elementary forces of nature, in such a combination of efficiency and economy that the present prosperity has been realized? It is rather hard to dodge the fact that the fundamentals of engineering serve well, in a broad sense, as the fundamentals of commercial industry.

An enviable position in the journalistic world is at present held by the engineer, and his prominence is steadily increasing along such lines. The writer of technical articles, or the editor of a technical magazine is constantly developing a language to better present his work before the public; thus his ideas are ever becoming clearer to the average person with small technical knowledge. His subjects, when understood, are interesting, his audience increases; consequently, the realization of his true worth, in relation to modern development, is constantly approaching its proper standards.

During the course of a talk, given by George S.

Frank, C. E. '11, before the Student Chapter A. S. C. E., at the last meeting, the fact of the predominance of engineers holding the position of purchasing agents for large concerns, was emphasized. Off-hand, the connection between the two lines may be vague, but, when it is realized that economy is a fundamental basis for both, the connection becomes much clearer.

A field which promises to become prominent in the near future is the development of the huge oil shale deposits of the West. This was discussed at length in an article of the Cornell Civil Engineer, issue of May, 1922. As pointed out in this article, the oil shale deposits must furnish us with our petroleum products upon the exhaustion of our present method of supply and, as ever, the engineer will be called upon to "start the wheels rolling".

In conclusion it might be said that the successful engineer of the day cannot be the single track technical wizard as pictured by some, but, on the contrary, in order to view clearly his ever widening horizon, his training must be of such broadness as to enable him to act with decision whatever the nature of his task.

We are publishing in this issue, an article on "Logging Engineering" by Mr. Walter J. Ryan. This article is well worth reading and should prove interesting to everyone as it is in the form of a clear and concise discussion. After reading the article and digesting a number of its ideas, we feel that Mr. Ryan has also caught the spirit of "New Fields".

AN INCIDENT

One of the four questions in a recent preliminary examination given in Municipal Sanitation, C. E. 252, by Professor Ogden was "Draw a diagram and explain in detail the operation of a pulsometer". The majority of the members of the class answered the question more or less correctly, but there were several who, in attempting to answer it, showed that they had absolutely no conception of what a pulsometer pump is. If a student through inadvertence fails to read that part of the text dealing with the pulsometer pump, he really ought to know what it is just by his contact with the civil engineering profession, either by seeing it in operation on a construction job or by gleaning his knowledge of it from the advertising pages of a technical magazine. Surely there is no excuse for answers like, "A pulsometer is a device for resuscitating the drowned", or "I don't know what a pulsometer is but I could tell you all about a reciprocating pump".

The point we wish to make is that if by the time they are seniors civil engineering students do not have some knowledge of such commonplaces as pulsometers, Tarvia and Imhoff tanks, they have no right to be embarking upon careers as civil engineers.

Advice to Young Engineers

Abstract of address given before the Cornell Student Chapter, American Society of Civil Engineers, at its Annual Banquet on April 28, 1922

By EDWARD J. PEARSON, '83
President, New York, New Haven and Hartford Railroad.

It is nearly thirty-nine years since I graduated, hence I presume you want to learn from me what the college should and should not do. Cornell in my recollection stands at par or better. There are none I remember with greater pleasure and interest than the professors who were here, as well as my other associates. As time goes on and you also commence to think back, if you feel as I do, you will realize that the University is running on good true lines; you will be happy in realizing you are a graduate; and the only trouble you will find, may be that you did not avail yourself of all the opportunities.

Engineering work often results in the building of monuments. The Milwaukee extension to the Pacific, in a way, is a monument. Care is required, because monuments will be looked at critically in years to come; particularly if you do not build them right. Engineering affords opportunity for expansion in other lines of service and into correlated undertakings. But underlying the whole is the need of good and substantial engineering education. Here and now is the time and place to obtain it. In the School of Civil Engineering, there are the equipment, the facilities, and in particular the Faculty. They should be availed of fully, before passing under the pressure of business when automatically the time and opportunities become less.

Requirements for Success

Whether you have a university education or not, there are several things of even more importance. They are character, physical condition, personal methods, and the human relation. Then higher education. After that comes experience.

Education gives a good running start, also certain opportunities for which the non-technical is unable to qualify. Fortunately, I have been associated with many different kinds of work and of men, and through the College of Hard Knocks, have absorbed things in addition to what was taught me at Cornell.

Not long ago I participated in a conference in regard to the teaching of Transportation. There were present technical men, educators, prominent men of affairs, and some railroad executives. One executive remarked, looking around the table; "You were a traffic man, I can employ traffic men; you were a lawyer, I can retain them; you were an engineer, I can secure their services; but", alluding to two

prominent self-made men, "what are the qualifications of yours? That is what we want to teach." The search for ability to operate and manage—the qualifications for leadership. Unfortunately there is no text book nor course of instruction that fully covers that feature in the final analysis.

As an illustration, a piece of contract work is to be performed. The property is bought. The franchises are secured. The company is organized. The mechanical engineer plans the steam shovels and other equipment. The chemist makes the explosives, the engineer designs and lays out the work. After all these preliminaries, the contractor constructs the camps and brings in the horses and the men. He mans the equipment. He is really the administrative force in the large degree, that performs the work; and incidentally, if profits are made, they go to him. Very likely that contractor could not take the place of the engineer. But the engineer can take the contractor's place, if he develops beyond the lines of his profession.

Advancement

Illustrating further the competition the engineer is up against, note the customary lines of advancements through the operating departments of railroads. The technically handled portions of the service are important, but the purpose of a railroad is to run trains, switch cars, and to handle the public. The lower ranks in Transportation do not require special education. But among the large number who start in the lower ranks, there is an occasional one who has a bright mind, who is persistent, and who will educate himself. Such a man may commence as a Call Boy. When there is an opportunity to place a yard clerk, "little Jimmy" naturally gets the job. Similarly, when there is a yardmaster's position vacant, the hustling yard clerk, or yard conductor, who knows all the details of the terminal, is a natural selection. The same principle operates when a trainmaster is to be appointed. Gradually the man in self-making will keep moving up the transportation side. Nevertheless there are levels at which the different departments come together, and from which through promotion the responsibility broadens. Such, for example, are those facing the Division Engineer, the Master Mechanic, and the Trainmaster, when a Superintendent is to be appointed. If the Division Engineer is also a human engineer, and if he has paid attention to the branches other

than his own, his prospects are improved. And so it goes, upward along the Railroad ladder. You can appreciate the necessity for the engineer to broaden at every opportunity, if he expects to advance.

These instances are outlined particularly, because you must appreciate the competition that confronts you by those of bright minds, who without your education are nevertheless benefiting by their constant activity and practical experience, in what we might term the front line trenches. If the educated mind appreciates this situation and will do those things that will broaden and enable him to expand outside of his own profession, reward should follow. The public has the impression that engineers are too mechanical to manage. It is a handicap that confronts the engineer and one that he only can remove.

Personal Recollections

I recall an engineer on the Milwaukee road. He was bright, competent, and had a fine record. He came out from the East. We put him in charge of a locating party in the wilderness. It seems he was so technical and cold his men were not with him. The work of the party was poor. Then with regret, we put in charge a man who had mushed in Alaska. The work of the party was thereafter excellent, although the engineering ability of the engineer was relatively low.

After completing but just before opening the Milwaukee, we suffered from serious fires that burned over the twenty mile section of the Railroad crossing the Bitter Root Mountains. Nearly two miles of temporary wooden bridges were practically destroyed. Arriving the following day, I found the camps also were destroyed, but along toward evening one of our engineers arrived from Missuola. He had earloads of camp outfit and supplies. A message about the same time from another engineer advised he would be in from Spokane the next morning with additional outfit. Without orders from a distance, they realized the first thing to do was to open supply camps, and to bring in the large force of men necessary. As engineers, they were practical and most decided successes. They appreciated that the feature of preparation that would make the work go, was that of taking care of the men. They became successful contractors.

While superintendent in charge of portions of the Northern Pacific, along the Yellowstone, Hell Gate, Missuola, Clarks Fork, Yakima, and Green Rivers, in the days when the Road had been permanently completed and when temporary timber bridges, not much rip rap, and wooden lined tunnels were the rule, landslides, washouts and fires were only too frequent. I used to make it a point in case of trouble, to go on the hand car in the front with the torches and lights, to inspect the road. I had a crew that would follow me through any kind of a storm. We could always open up our part of the road more

quickly than others. Our orders were not sent over the wire; we were on the firing line.

Mr. John Hays Hammond, writing for the Yale News, well outlines certain qualifications for, as well as certain features pertaining to the engineer. They follow.

The practical side of imagination and vision, which is not limited to artists. The Panama Canal and the great irrigation projects are examples of the result.

Originates, instead of following directions.

Thinks, instead of following the thoughts of others.

An executive, not an employee.

Receives commissions from non-technical people, instead of getting orders in technical language.

If successful, has certain necessary social relations.

Has extended business relations.

To fulfill these obligations and stand on a high professional level. Mr. Hammond outlines further that the engineer must be competent somewhat as follows:

In thinking clearly, logically and in proper sequence.

In construction and composing mentally.

In commanding his subordinates by his culture, intelligence, and poise.

In giving orders that can be immediately and properly understood.

In translating at sight from non-technical to technical thought and language, and vice versa; in talking about his profession non-technically so that the layman can perfectly understand him. This is one of the handicaps under which many technical men work; they are so imbued with the jargon of their profession that they are unable to make the business man who employs them understand what they are talking about. This is true not only of engineers; it is often true, also, of physicians, lawyers, and architects.

In being congenial with all kinds of people outside his profession; able to talk intelligently on various subjects; in having a good fund of general information; in being perfectly at ease everywhere; and in having a large acquaintance among people of standing.

In understanding the principles of economies and business methods; in knowing a good deal about finance and the money market; and in being able to see the business man's point of view.

These are the bare essentials to the engineer as a professional man, which raise him above the plane of the skilled worker. Without them, he limits the possibility of his professional success, by making a definite stopping-place in his progress. Beyond a distinctly subordinate position in which he carries out the technical details of some one else's plan, he will find himself over his depth. It is therefore his duty to himself to acquire at least these fundamentals, but an engineer's duty does not stop with himself. He has an obligation to improve and sustain the reputation of his profession. As a profession, engineering is liable to lose standing if it is filled with

"half-baked" men—men who know every technical detail, yet unable to say a dozen sentences without a grammatical mistake, who have no facility for conversation which is not "shop"; who have no fund of general information, no knowledge of public affairs—in short, men of whom their fellow and successful engineers may not be proud.

I left Cornell and went to the Northwest, simply because I found an opening there. While on the Northern Pacific, there were three occurrences, small in their way and unappreciated at the moment, which have proved to be controlling factors in my further movements. The President of the Missouri Pacific later, then had charge of the company's mining operations on the East side of the Cascades. I was Superintendent and handled his shipment to tidewater. He was short of coal at the tide water piers, and was confronted with a serious situation. He was advised if he could mine the coal, it would be moved. He was doubtful. The limited supply of coal had never moved with the required rapidity before. He was induced to put his miners in the next morning. The officers and myself got together. Between night and morning we moved the empties back from piers to the mines and the loads from the mines to the piers. We kept that up night after night while the pressure was on. We could not have kept it up forever, because the burden was too heavy for men and equipment and the movement of other traffic had to be deferred, but we saved him his troubles. It was a point he remembered years after, when he had opportunity to appoint a First Vice-President of the Missouri Pacific. Another officer on the Northern Pacific, my superior, was favorably influenced by certain work on grade reductions. Later when the Milwaukee Road was about to appoint a Chief Engineer for its Pacific extension, it was thru his endeavors that the invitation came to me. The third instance was that of an Executive Officer, formerly on the Northern Pacific, who became interested in the special work I did there, in planning work on yards, engine terminals, station layouts, etc. Realizing the lack of development in preceding years in this regard on the New Haven, where he was then in authority, I was invited to that Road. Those were three really trivial things, but they happened to become controlling in ways that were important to myself.

From my experience and study, and having gone to the Northwest just because it so happened, the conclusion is reached that if a young man selects the kind of work and the location in the world, both of which he prefers, he can drive his stake where he elects, with a pretty good probability of success; providing that instead of setting his limit, he is willing to take hold wherever there is an opening and commence to climb from that point, subject of course to the actual presence of a suitable field for his endeavors.

There appear to be better opportunities ahead at present for an engineer than for a long time. . . . While the character of the engineering work may be different, there may be no Panama Canals or long Transcontinental Railroads to build, there will be as large a volume of money, and probably more, that will go into engineering construction. At the end of every twenty years, forty years, or at some other periods, old structures are taken down and replaced by those more adaptable. While some work is in a sense permanent, much is rebuilt in cycles.

Taken in its whole, there is reasonable regularity in employment. Temporary construction positions represent but a small part. Public works offers a big field. There are more engineers in contract work than heretofore. A new undertaking for engineers is that of valuation. Nearly everything of public utility and many other industries have to be valued. Efficiency work in which engineers are participating is increasing. There are opportunities to expand into other activities.

Kinds of Subordinates

As you go along, you will find there are four kinds of subordinates. First are the comers, few in number; they will be our successors. All they need is guiding encouragement. This is the group with which you should qualify. Then the steadies, the large majority; their need is advice and direction. Drones are a small class; usually good use can be made of them by using the club. Last and relatively small in number are the no goods who should be eliminated when satisfied that no other course avails.

Organization runs clear down into the lower branches. Success takes team play between the junior and the superior officer, so the problem can be studied from below as well as from above. Of course, obviously, the first thing is to hold the confidence of the superior. The next is to arrange not only for perfection of performance at the moment of whatever is being done, but to always carry the plans far ahead. Then there is the selection of those who if possible, know even more of their specialty than does the one in charge. The best compliment I can realize is that of having experts associated with me, those who do good work themselves. Location of authority and responsibility is very important. Authority is generally misunderstood. In a broad way, it results from discussions between senior and junior officer, so that both understand the situations fully. Team play with full understandings, is imperative between senior and junior officers. If there is a full understanding, authority exists, and in a full measure that cannot be given by words sufficient to cover any large, general and constantly changing situation. There is necessity for clear instructions. It is well that those who actually do the work receive the credit. You must command respect, but loyalty can only be won. Many of your representa-

tives may not see you or your superior for long intervals. There is always opportunity to soldier when the chief is not there. If you have loyalty, you will have support at all times; and the combined endeavor is necessary to win in the large degree. Keep the troubles at home; within the official family, and only with those concerned if possible; but you can be public in commending good work. The present day is one of the leading; driving is over the dam. Do not drift. If you are going to be popular, you must sincerely at heart like your associates and your representatives. Be free in commendation. Have a good word for all. Throw your personality into the undertaking. It will result in an organization and a following, that is invaluable; that cannot be bought by money.

The Present Railroad Situation

Presuming you are interested in the railroad situation, I may add that the trouble is that for the last twenty years the railroads have been more or less strangled by public regulation, and consequently have become less prosperous. The problem is not pleasant, it is difficult on account of the necessity for cutting and trimming down the expenses. Nevertheless the railroads today are a \$20,000,000,000 proposition. They employ 1,800,000 men. Of course in any such large undertaking, there are many problems of importance. It is a good business and interesting. It is desirable an engineer entering railroad service commences at the bottom. This helps toward advancement. If the railroad engineer does all of the things that he should, particularly in the way of attention to what I have termed human engineering and in broadening by observation, he has good prospects. Just for example, there are several railroad presidents who were engineers. On two roads that I happen to think of, the second man in charge of the operating department is an engineer. While it is true that the larger part of the operating officers are free from the transportation ranks, nevertheless engineers are increasing in the official roster. There is this difficulty in regard to railroad work, it is a twenty-four hour proposition and for seven days a week. To handle the football day crowds such as we have on the New Haven, or during storm, the officers must be on the job instead of playing. If the Transportation Act functions and the Commission is reasonably liberal, the prospects are that railroading is going to come back to its former class of favoritism. If it does, there will be a tendency to enlarge the technical staff, and to enlarge efficiency work which can be done only by trained minds.

In receiving applications for employment, and perhaps you all intend to make them, it might interest you to know the point of view of the employer. We have received applications from men who ap-

plied for positions as assistant engineers, instrument men, or rodmen; we rate such applicants as belonging on the end of a chain or an axe handle, or perhaps lower. Others briefly state what they can do and want to do with their experience. Such receive attention. If they add that they will take anything that they can get until there is a better opening, such applications are advanced on the list.

An old conductor once said to me, when I was a young engineer, "I notice that some of them are more God given than others, but I notice the best engineer is the one that works." There is much in his remark. The eight-hour day never sufficed to bring the world to its present development; it never won a reputation; and it never made a fortune.

In looking ahead, progress always seems slow. In looking backward, the picture is quite often reversed. Everything may look slow ahead, but if one keeps doing his best, pays attention to every responsibility and opportunity, then in looking backwards the picture will undoubtedly reverse.

I notice that some important educational institutions, through their societies of associations for so-called free thought, are receiving lectures by representatives of organizations of the socialistic order, by conscientious objectors who have spent terms in confinement, and by those who have organized and led strikes. I do not know whether you are hearing such lectures here, or not, but whenever you do, I hope somebody will talk on the opposite side, and that you will study the opposite side yourselves. The class of men that are doing the talking are working against the best interests of the country. Today the workman who has savings is a capitalist; I am in fact a workman. Where one commences and the other leaves off is difficult to say. In my mind, the solution is fair treatment of all, study of the other fellow's point of view. But I cannot help but be concerned at the propaganda of that kind. Some say the way to straighten out affairs is to put workmen on the Boards of Directors. I agree with the proviso that because of competence they advance through the management and arrive on merit, or that by saving money they land as members because they are owners.

Conclusion

The essential point I want to make is that of the human side. You must go along with the technical 100% but develop the human side and the practical. Some think there is a spark of genius that will carry them thru, but it is not in the cards unless thru work, you develop that spark and put it there. My advice to you is this: do the best you can; give attention to the Golden Rule, as you understand it; stand for old fashioned, thorough Americanism; then add your advantages at Cornell; all of which combined will equal success.

Logging Engineering

A New Field for the Civil Engineer

By WALTER J. RYAN, C. E. '06

Civil Engineer, Weyerhaeuser Timber Co., M. A. S. C. E.

At nearly every session of the Pacific Logging Congress the subject of logging engineers has been presented and it is difficult to understand just what your committee can expect at this time that is of interest or value. Various lists of requirements have been presented, until Professor Bruce computed at one time that it would require fourteen years of college training to teach all that a logging engineer was expected to know. But during these years the university have developed courses of study and training that give the young man a foundation for and a view into the work, and their graduates are rapidly finding for themselves places of usefulness in the industry.

Engineering Defined

Engineering has been variously defined. Probably no definition is more important to keep before the engineer and employer alike than "The art of doing with one dollar what any fool can do with two". For logging engineering we can say "delivering all of the logs from a stand of timber at the lowest total cost". A recent definition by a committee of the American Society of Civil Engineers is most satisfactory,—"Engineering is the creative science and art of applying economically the materials and forces of nature to the use and convenience of man". It recognizes that Engineering must be creative, must make progress, and do things better and cheaper than they have been done before. It also recognizes that engineering is both a art—the knowledge of how to do things—and a science, or understanding of the fundamental laws by which we can work with nature.

Requirements for a logging engineer

As a training to fulfill the requirements of this definition, the young man must be grounded in the sciences and mathematics, not so much for the facts that he may acquire, as for the training in thinking accurately, and in gathering all the facts that bear upon his problem before coming to a definite conclusion. In our particular case, he must **also know thoroughly the art of logging**, not only the particular phase with which he may be thrown in contact in his work, but all that goes to make the complete operation, from the purchase of the timber lands to the marketing of the logs.

This information he must acquire from the actual operation. Opinion will always differ as to how these two parts of his training should be combined and that is the problem that our educators are trying to solve. But whether they occupy little or much

of his time in school with these studies, the great fund of this information must be accumulated slowly and after he is out of college.

It is a weakness of our school system, probably inherent in our American love of independence, that there is no way of eliminating from a given course of training those who are by nature ill-adapted for it. We will continue to turn out from our engineering schools men better suited for merchants, farmers, or lawyers. These misfits may find their way into some other field or they may spend their lives in their ill-chosen work, but they will never be leaders.

In order to be successful in acquiring the vitality necessary training in the art of logging, the young graduate must combine keen powers of observation with a fair share of common sense. He will seldom find anyone around a logging operation with time or inclination to tell him what is going on, and he will rarely have time from his own work to spend in a deliberate study of the work of others. It is too much to ask that he go through the whole course of working on every job in the woods; and if he did, by the time he got to be a brakeman, the yarding crew would have a different system of logging and he would have to go back over the ground again. He must grasp what is being done and why, from an occasional glimpse or a casual conversation, and he will have few opportunities to learn in this way if he goes about with the "know it all" attitude that practical men expect in a college graduate and, unfortunately, sometimes find. He must have sufficient imagination to conceive of changes and visualize the results that he might accomplish. Above everything else he must have his heart in his work. If he likes the woods, likes the rough outdoors life, likes to go up against difficulties that floor him and get up and go at them again, if he is satisfied that his work is more worth while than play or society or fame or riches, he is going to make good. Whether he becomes a cruiser, a surveyor, a superintendent, a manager, or an owner depends upon his natural abilities and outside circumstances; but if he really enjoys his work, he will get the best for himself and be worth the most to his employer.

Nature of the work

Such a man will be worthy of a high place in any logging operation, but before he can gain the experience that will make him such a logging engineer, he must serve a long apprenticeship. During this apprenticeship, a little friendship, support, and

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SCHOOL NOTES

STUDENT CHAPTER A. S. C. E.

On January 8 at 8:00, P. M., the regular monthly meeting of the Cornell Student Chapter of the A. S. C. E. was held, as usual, in Sibley Dog. All C. E. alumni resident in Ithaca were invited to attend. More than fifty members and guests were present.

After a short business session presided over by Pres. Spurney, a few selections on the bagpipes were given by W. R. Crawford, '24.

The main speaker of the evening was G. S. Frank, C. E., '11, Manager of Purchases for the University. He spoke of the qualifications necessary for a purchasing agent and of the work done by his department. The University has saved large sums of money and also improved the quality of goods purchased by the coordination of purchases under one head, Standardization of materials, taking of cash discounts, and other such business measures have served to eliminate much waste.

A short talk was given by H. W. Hourigan, '23, on the inspection of concrete highways during construction. Capt. D. H. Blakelock, '23, talked for a few minutes on engineering work in the army. He gave a brief outline of the function of army engineers under the varying conditions of war and peace.

The C. E. banquet committee for 1923 was announced as follows: Chairman, M. J. Grogan '23; H. P. Bosworth '23, E. W. Downs '23, F. Van Epps Mitchell '23, T. Telfer '23, P. F. Beaver '24, C. L. Felske '24, L. A. Tompkins, Jr. '24, D. C. Kline '25, B. Edstrom '25.

CORNELL SOCIETY OF ENGINEERS ELECTIONS

At the fall meeting of the Cornell Society of Engineers in New York on November 6, the following officers were elected for the year:

President, Carroll R. Harding, C. E. '10; first vice-president, Samuel B. Whinery, M. E. '99; second vice-president, Ezra B. Whitman, C. E. '01; recording secretary, Robert W. Gastmeyer, C. E. '11.

After the election of officers and the reading of reports by officers and committee chairmen, the meeting was turned over to President-elect Harding.

This procedure was followed by the speeches of the evening.- Ezra B. Whitman '01, Alumni Trustee, spoke on the relation of the society to the University. He was followed by Frederiek A. Waldron of Boston, who presented "Public Recognition of the Engineer in Building Construction". Mr. Waldron contended that the engineer does not receive proper recognition of his work, in spite of the fact, that, in the construction of modern buildings, approximately eighty per cent of the cost is represented by the work done by the engineer, while only twenty per cent is represented by the work of the architect. The last speaker of the evening was John H. Lawrence '09. He spoke on "The Hell Gate Power House Design". Lawrence pointed out the difficulties in designing a power house for congested New York City.

FUERTES MEMORIAL PRIZES

Charles H. Baker, C. E. '86, established a fund in honor of Estavan A. Fuertes, Dean of the Faculty of the School of Civil Engineering, at the time when the donor was in college. The income from this fund furnishes the three prizes of \$135, \$35, and \$20 which are given to the three highest competitors in a public speaking competition. The preliminary trials and final speeches are held in April.

The requirements for the speech are: first, it must be argumentative; second, it must be of a technical nature; and third, it must be delivered in not more than fifteen minutes. Delivery must be made with-

(Continued on page 62)

ALUMNI NOTES

JAMES A. SOURWINE '12, EX-CAPTAIN OF ENGINEERS, U. S. A., NARROWLY ESCAPES DEATH

Cornellian Found Unconscious in a German Railway Carriage

James A. Sourwine had a narrow escape from death when he was assaulted and robbed near Frankfort, Germany. He was sent to Europe in June to represent the Department of Agriculture, Bureau of Public Roads, in selecting and shipping back to this country machinery, equipment and supplies suitable for use in the construction and maintenance of public highways. His work made it necessary for him to divide his time between Coblenz and Paris. On October 28th, after practically completing his mission, he left in the evening for a two weeks' vacation in Southern France. He was sleeping alone in a first class compartment when another passenger entered at a small station. Sourwine was awakened by his entrance and observing that the passenger was absorbed in reading a book, returned to sleep.

He next awakened on the morning of October 30th in a hospital in Frankfort-am-Main, Germany. He had been brutally assaulted and robbed sometime before the train arrived in Frankfort. The train stopped for an hour in the Frankfort station and was about to depart when the conductor noticed that the occupant of this compartment had not changed cars as scheduled at this station. He entered the compartment and in trying to awaken Sourwine in the dark found him covered with blood. The police were notified and Sourwine removed to the hospital. He had been struck with a lead pipe which paralyzed his jaw for over three weeks. He was then stabbed with a heavy knife, twice on top of the head; another gash, extending from the forehead over the left eye, passed through the left eyeball, shattered the cheek bone, and severed the left upper jaw bone. He was otherwise stabbed and mutilated about the face and neck. Fortunately there were present in the hospital an eye specialist and an expert head surgeon. After three weeks in the hospital he returned to his work.

A letter recently received by the Department states that the vision in the left eye is about one-tenth normal, but the eye specialist hopes to have it normal within a few months. His recovery from the assault was due wholly to his fine physical condition, in which he has always taken great pride.

He was a member of the football squad while at Cornell. During the war Sourwine served as Captain of engineers and while with the Second Regiment of engineers in the St. Mihiel drive was wounded. After returning to the states and receiving his discharge from service, he was appointed a senior highway engineer in the United States Department of Agriculture, Bureau of Public Roads.

CERTAIN CORNELLIANs HIGHLY HONORED

The American Society of Civil Engineers annually elects one president, two vice-presidents and six directors. This year, three of these officers are Cornell graduates, as follows:

Vice-President—Anson Marston '89, Dean of Engineering, Iowa State College, Ames, Iowa.

Directors—Glenn D. Holmes '96, Chief Engineer Intercepting Sewer Board, Syracuse, N. Y., for district 3; E. B. Whitman '01, Member of Norton, Bird and Whitman, Baltimore, Md., district 5.

'01. LeVair M. Burt is now Assistant Engineer with the Bureau of Highways at 50 Court St., Brooklyn, N. Y.

'05. A. S. Brainard is associated with the Standard Oil Company of New Jersey, 31 Clinton St. His home address is 87 North 18th St., East Orange, N. J.

'05. Captain Frank C. Tolles is now associated with the firm of Swigart and Ehrman in the general practise of engineering at Akron, Ohio.

'08. Leon M. Brockway has moved to Josephine, Pa., where he is connected with the firm of Conway and Reid, engineers and contractors.

'09. James M. Felknor has been selected by the supervisors of Calusa County, California, to supervise the construction of approximately 50 miles of highway, funds for which have been raised by a bond issue.

'09. Walter Gibb is secretary and treasurer of the Shingle-Gibb Leather Company, 54th Street and Grays Avenue, Philadelphia. His home is at 4650 Locust Street.

'10. Thomas W. Barnes is associated in business with W. F. Hebard under the firm name of W. F. Hebard Co. They are distributors for Baker Industrial tractors and trucks and other material-handling equipment. His business address is 319 North Michigan Ave., Chicago.

'10. A daughter, Barbara Louise, was born on April 12, to Mr. and Mrs. John Longwell of Powell,

Wyoming. Longwell is manager of the Shoshone Irrigation Project of the U. S. Reclamation Service.

'10. Charles P. Reed has been elected an Associate Member in the American Society of Civil Engineers.

'11. Samuel A. Graham, who recently returned with his wife from Sydney, Australia, where he had spent the past three years as manager of the Tanners' Trading Company of Australia Ltd., has severed his connection with that company to become associated with the Certainteed Products Corporation, with office in the Woolworth Building, New York. His address is in care of Mr. William Allan, 136 West 79th Street, New York.

'11. '12. John P. Bonner is associated with the firm of Scott and Bonner, Beckley, W. Va.

'13. The computing division of the Manila Field Station of the United States Coast and Geodetic Survey is one solid Cornell crowd. The chief of the division is one, E. W. Eickelberg '13, a hydrographic and geodetic engineer with the Survey, while Benjamin Friedenbergl '17 is a hydrographic and geodetic engineer on special detail in the computing division. H. S. Rappleye Ex '15 is chief computer for the division, and that is all the Americans in the division, the remainder being Filipinos. Pretty near 100% they call it.

'13. W. H. Brainard, Jr., is assistant Engineer of Bridges, Southern Railway, Lines East, Charlotte, N. C. His home address is 209 Crescent Ave., Charlotte, N. C.

'13. Howard H. Snyder has been elected an Associate Member in the American Society of Civil Engineers.

'13. Russell D. Welsh has accepted a position with William C. Olsen '09, consulting engineer, of Kinston, N. C., and is located in Elizabeth City, N. C., as resident engineer on the construction of public utilities for that city. He would be glad to hear from Cornell men in that section.

'13. J. Winthrop Brown is a practicing engineer at 342 Madison Avenue, New York City. His home address is Millington, N. J.

'14. John S. Bailey has been elected an Associate Member in the American Society of Civil Engineers. Bailey is Construction Engineer for the Portland Cement Association with offices at 1321 Hurt Building, Atlanta, Ga.

'14. Captain Roy D. Burdick is military assistant to the district engineer at Honolulu, T. H., and is in charge of the construction of fortifications. He expects to return to the U. S. about June, 1923. His address is 61 Cleghorn Drive, Honolulu.

'14. Edmund U. Ragland was married on September 30 to Miss Mary E. Marshall of Little Rock, Ark. He is a buyer of mill supplies for the Central Supply Company of Little Rock.

'14. Paul L. Heslop is designing a hydro-electric

plant on the Clarion River near Pittsburgh for Charles B. Hawley and Company of Washington, D. C. He lives at 1723 Nineteenth Street, Northeast, Washington, D. C.

'15. Captain George L. Kraft, U. S. A., has been ordered to duty with the 42d Infantry, Camp Gailard, Panama, Canal Zone, beginning January 18, 1923. He expects to be there for the next three years.

'15. Charles F. Starr is chief engineer with the Genesee Bridge Company, Rochester, N. Y. He lives at 147 Penhurst Street.

'17. Ernest W. King has been elected an Associate Member in the American Society of Civil Engineers.

'17. G. T. Barton is working on the construction of a school building at Medina, N. Y., for the Seneca Engineering Co. of Montour Falls, N. Y.

'19. Lieut. John C. Gebhard, C. E. C., U. S. N., is assistant public works officer of the Virgin Islands, stationed at Christiansted, St. Croix; he has been serving as acting public works officer for the past three months and is now relieved by Lieut. C. Reid Johnson '13, of the Civil Engineer Corps. Robert J. Auld '14, and Nathan November '19, are on board the Ranger, a United States Coast and Geodetic Survey boat, which enters at Christiansted, so that there is something of a Cornell Union in the tropics.

'20. Miss Olive W. Dennis is a designer in the bridge engineering department of the Baltimore and Ohio Railroad.

'20. Laeey L. Shiry, formerly Assistant Engineer with the C. C. C. and St. L. Railroad, has been made a designing engineer with the same road. He is stationed at Cincinnati, O.

'20. Gerald C. Williams, a former editor-in-chief of the Cornell Civil Engineer, is in the Air Service Primary Flying School at Brooks Field, San Antonio, Texas.

'21. Salvador Quinones has opened an office at Mayaguez, Porto Rico.

'22. Announcement has been made of the engagement of Miss Mildred M. Schory (Ohio State '23) and G. Milton Benson '22 of Baltimore, Md. Benson is a designer and draftsman in the Bridge Department of the Baltimore and Ohio Railroad at Baltimore, Md. He lives at Mayfield Terrace, Halethorpe, Md.

'22. Lester T. Haldeman is with the Engineering Department of the Bell Telephone Company of Pennsylvania. His home address is Westville, N. Y.

'22. Harold G. Hunt was recently appointed to the staff of the Technical Advisory Corporation of Worcester, Mass., for work in connection with the city plan for that city. Since his graduation he has been employed by the Groveton Paper Company, at Groveton, N. H.

In Memoriam

William Brown '93.

William Brown, died at his home in Belfast, N. Y. on July 22, 1922. He graduated from Cornell in 1893, receiving the degree of C. E.

After graduation Brown worked with the Beecher Equipment Construction Co. of Watertown, N. Y., and with several other firms until 1902, when he entered the employ of the American Bridge Co. of Pittsburgh. In 1903 he was location engineer for the Hankow-Canton Ry. in Shanghai, China. Returning from China he was engaged in engineering work in Seattle, Wash. and from 1907-09 he was with the Light & Power Co. of Rio de Janeiro, Brazil.

Upon his return to the United States in 1910, engineering work took him to Brooklyn, N. Y., and then to Niagara Falls, N. Y. In 1913 he retired from the engineering profession and took up farming in which he was still engaged at the time of his death.

Walter Granville Guss '06.

Walter Granville Guss '06, died at the Garfield Hospital in Washington, D. C., following a brief attack of pneumonia.

Mr. Guss was born in Philadelphia, on August 16, 1883, the son of Mr. and Mrs. Harry T. Guss. His early education was completed at the Central High School in Washington, from which he entered Cornell, graduating in 1906.

The deceased was one of Washington's most prominent civil engineers, having achieved an enviable reputation through the important construction projects in which he had been engaged. His earliest work was done in connection with the St. Mary's Canal. Recognition of his capable work there won him a position as chief of one of the construction departments with the Capitol Traction Company.

After some years with this company, he affiliated with Clark Waggoner, an architect, assuming charge of several important building projects. Since 1911, Mr. Guss had been operating independently as an architect, engineer, and builder. During the last few years of his life, he had constructed several large apartment houses, owning and operating these himself.

Herman David Hirsch '09.

Herman David Hirsch was born in New York City on the 19th of October, 1886. He graduated from the College of Civil Engineering at Cornell University in 1909.

After graduation he entered the employ of the American Bridge Company as Structural Steel Draftsman, becoming Assistant Engineer in 1911, serving in this capacity until 1919. During this

time he was engaged in design of emergency dams for the Panama Canal, and steel boats for the Government during the World War. He also perfected designs for the military bridges in France.

In 1919 he became associated with the United States Steel Products Company and was sent to Cape Town, South Africa, as Resident Engineer, which appointment he held until the time of his death, on August 30th, 1922. He is survived by his widow and two daughters.

Although his career was cut short by his untimely end, Mr. Hirsch lived to fulfill his promise as a brilliant student, always discharging the duties of his various positions with great satisfaction, and being held in high esteem by his associates for his professional ability. He was a man of sterling qualities and integrity of character, conscientious, upright, frank and sincere, loving his work with singular devotion. His personality was winning and attractive and all who came in contact with him were pleased to number him among their friends.

Mr. Hirsch was an Associate Member of the American Society of Civil Engineers.

S. August Kalberg '09.

S. August Kalberg died on November 6, in Worcester, Mass. Kalberg was born on September 20, 1886, a son of Mr. and Mrs. Charles O. Kalberg. He prepared for College at the New Britain, Conn., High School, entering Cornell in 1905 in the course of civil engineering. He left in 1907, but returned the following year, receiving the degree of C. E. in 1910. For a year after his graduation he was with the Berlin Construction Co., of Berlin, Conn.; then he became associated with Stone and Webster, and was located in Keokuk, Iowa. For several years he had been with F. T. Ley and Company in Springfield, Mass.

He was a member of the Swedish Lutheran Church, New Britain Lodge, B. P. O. E., and the Masonic Order.

Dr. Spencer B. Newberry.

News of the death of Dr. Speneer Baird Newberry, head of The Sandusky Cement Company of Cleveland and for many years an outstanding figure in the Portland cement industry, has come as a great shock to his personal and business friends and to the trade in general. He was stricken at the wheel of his car on Tuesday, November 28, while driving through the down-town district of Cleveland on the way to his office.

Dr. Newberry was born in 1857, and for a number of years following his graduation from Cornell was

Professor of Chemistry in the University. In 1892 he founded The Sandusky Cement Company with a mill at Bay Bridge, Ohio. Serving for a number of years as General Manager, he was later elected President, which position he held until his death.

Under his management, the business expanded both in volume and in production units, the original Bay Bridge plant being supplemented by others at York, Pa., Toledo, Ohio; Syracuse, Ind., and Dixon, Ill.

Of the many important contributions that Dr. Newberry has made to the development and advancement of the industry, perhaps the greatest was his discovery of a practical method of rendering concrete waterproof. He was also very instrumental in making white cement practical from a commercial standpoint, and his firm was one of the earliest producers of waterproofed cements.

Dr. Newberry is survived by a widow and two sons, Messrs. Andrew W. and Arthur C.

L. A. Campbell

Mr. L. A. Campbell, who has been employed by the Civil Engineering College for the past seventeen years, died on January 21, 1923. The funeral was held on the afternoon of the twenty-fourth at three o'clock.

LOGGING ENGINEERING

(Continued from page 57)

cooperation from the management is indispensable. The usual place for the young engineer is in the survey party where he has little opportunity to watch the operation; but if he can get the ideas of the superintendent or foreman and keep in touch with the results they are getting, it will mean improved location of railroads and more economical opening up of the timber. Surveying, location and construction of roads will probably continue to be the main field of the logging engineer. In addition to this work, there are often problems in maintenance and reconstruction of railroad on which he will be consulted. But if he is the right type of man and has had the proper training, his ideas should be worth considering on dozens of questions regarding transportation, machinery, water supply, camp sanitation, etc. Such consideration will certainly help broaden the young engineer and it should prove of great value to the operation.

In conclusion I might summarize by the statement that the attitude of the logging superintendent is the prime factor in the success of the logging engineer.

SCHOOL NOTES

(Continued from page 58)

out notes, but illustrative material, such as diagrams, models or lantern slides, may be employed if desired.

In recent years, these prizes have been won by students in M. E. or Architecture; students in C. E.,

for whom the prizes were primarily intended, having failed to place or failed to enter. This is a sad truth to be stated concerning the lack of interest on the part of C. E. men in these prizes.

But, it can be disproved or made inapplicable. There are Juniors and Seniors in this School who can go out and win at least one place on this competition. Not only that, those men are duty bound to go out, for is it not the duty of each one of us to do what we can to add to the status of our School? And so, let there be some spirit shown. You upperclassmen who are versed in oratory get busy! Let this year see at least one of those three prizes captured by a man from C. E.

FACULTY NOTES

Professor and Mrs. Jacoby left Ithaca by motor on Monday, December 4, for Bethlehem, Pa., where they stayed at 810 High Street until December 26. At present, they may be addressed at 422 Glen Echo Circle, Columbus, Ohio.

On December 5, Professor C. L. Walker spoke before the Life Club of Elmira, an organization of boys in the junior and senior years in high school. The subject of his talk was "Vocational Training" in which emphasis was laid on the necessity of each boy's choosing his own line of work and the difficulties he would encounter in making the choice.

Professor H. N. Ogden attended a meeting of the Public Health Council of the New York State Board of Health on January 10. This Council meets monthly in New York City. It functions as an Advisory Board to the State Department of Health.

Professor S. G. George was recently installed as master of Hobasco Lodge, No. 716, F. and A. Masons. Professor George has long been prominent in Masonic activities. The same evening, Assistant Professor L. A. Lawrence was installed as junior warden in the same organization.

NOTICE

The United States Civil Service Commission announces that applications will be received until March 1, 1923, for appointment to the position of Highway Engineer, \$2,400 to \$3,000 a year. Candidates will be rated on education and experience and will not be required to report for examination. Full information may be obtained by inquiring of the Commission, Washington, D. C.

IN OUR NEXT ISSUE

In the March, 1923 issue Prof. Everett E. King, M. C. E. '11, professor of Railway Civil Engineering at the University of Illinois, discusses the relation of the railroad to the city in "Some Influences of the Railroad in the City Plan". Willard Beahan, C. E. '78, draws on a lifetime of experience in "Some Common Labor I Have Met". For the frontispiece there is a full page poem "The Army of God Knows Where—Civil Engineers" by Alfred Damon. Don't miss the March number.

CORNELL ENGINEERS' DINNER

The Cornell Society of Engineers held its annual reception and dinner in the Fifth Avenue Restaurant in New York City on Friday, January 19th. A crowd began to gather about 6 o'clock. By the time the dinner was ready to be served a crowd of between three and four hundred "roughneck engineers" had congregated—one of the largest dinners the Society has ever held. During this preliminary period, a general reception was in order with the renewal of old friendships and the opportunity of the various members to meet the faculty.

The dinner was served a few minutes after seven and was enlivened by the singing of a number of the favorite Cornell songs and by the class of '92 which told very graphically that "Cornell ain't what she used to be 30 years ago". "Lint" Hart of Boston and "Pink" Clark, leader of the Glee Club in 1914, led the singing.

At the conclusion of a very excellent dinner, the President of the Society, Carroll R. Harding, C. E. '10, introduced as the first speaker Dexter S. Kimball, Dean of the College of Engineering. Dean Kimball explained briefly the plans for the future Engineering Colleges at Cornell and urged the alumni to keep in touch with university affairs. This was followed with a talk by Pres. Farrand in which he explained that the most striking feature in the present attitude of the Cornell faculty is the desire to develop graduates possessing a broad viewpoint of life. Engineers, in his opinion, can no longer be considered simply as technical experts, but must also be able to help solve the more general problems of civilization, or, as he put it, "we aim to teach men how to live not merely how to make a living".

Following these speakers, Professor H. N. Ogden spoke briefly as a representative of the School of Civil Engineering. Colonel W. G. Atwood, '92, told how football was played "30 years ago"; and Mr. S. W. Wakeman, '99, recently elected Trustee of the University, spoke briefly.

The Engineers also had their first opportunity to hear Professor Paul N. Lincoln, Director of the School of Electrical Engineering, who spoke on the advantages of having experienced engineers on the faculty.

Following the speeches, Mr. Becker, President of the Cornell Club of New York, told of the plans for new quarters for the Club, and Mr. Johannes, the architect who designed the building in which the Club is to be located, showed slides giving views of the various rooms, etc.

The evening closed with some very interesting movies of Cornell athletics and other activities. Everyone seemed to agree that it was one of the most successful dinners the Engineers ever had.



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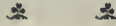
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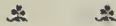
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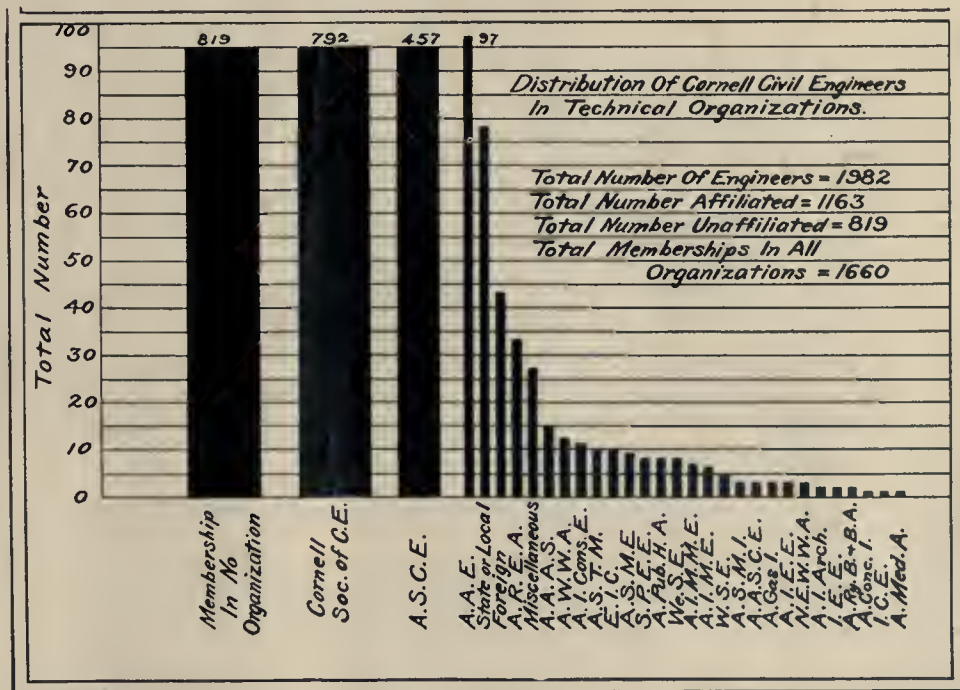
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MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

VOL. XXXI, No. 6

MARCH, 1923



Graph Showing Distribution of Cornell Civil Engineers in Technical Societies
(See page 64)



America's First Miners

When the mammoth and the mastodon grazed in the vast places of our early country, prehistoric men were busy pounding shiny fragments of native copper from their rock settings on the southern shores of Lake Superior.

These miners of the Stone Age first built fires to disintegrate the harder rocks, then they pounded out their treasures. Hammers of diorite or porphyry, shaped by the waters of the lake or by hand, occasionally grooved and fitted with a handle; wedges made of the very substance they were mining and tempered by the pounding that fashioned them; shovels of cedar that were used only as scrapers; bailers of bark or carved wood—these were the tools used in their open pit mines.

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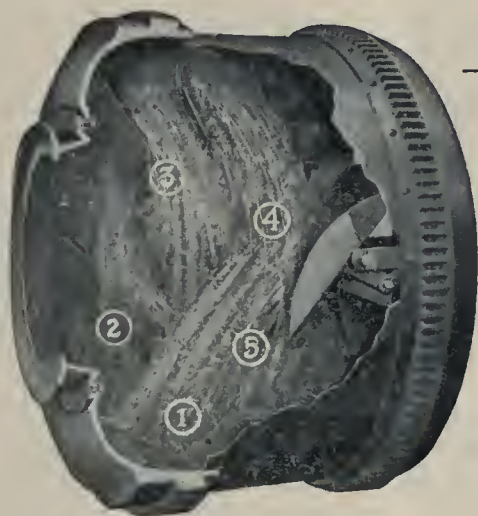
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Ithaca Engraving Co.	VI
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Lufkin Rule Co.	VI
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Potts, Clyde	IV
Sandusky Cement Co.	IX
Stover Printing Co.	VIII
Ward-Kurz Co.	IV
Westinghouse Electric & Mfg. Co.	XI

Test the Materials and then-



(1) Blade cuts through materials with churning action. (2) Blade carries materials up, spilling down again against motion of drum. (3) Materials hurled across diameter of drum. (4) Materials elevated to drum top and cascaded down to reversed discharge chute which (5) with scattering, spraying action, showers materials back to charging side for repeated trips through mixing process.

—remember that it depends on the mixer to combine the raw materials, aggregate cement and water into concrete that actually possesses the latent strength of the materials.

That is why Koehring-mixed concrete is Dominant Strength Concrete—because the five action re-mixing principle prevents separation of aggregates according to size, coats every particle of aggregate thoroughly with cement, and delivers uniform concrete to the last shovelful of every batch.



KOEHRING COMPANY
MILWAUKEE WISCONSIN

KOEHRING

THE ARMY OF GOD KNOWS WHERE

(Civil Engineers)

By

ALFRED DAMON RUNYON

No bands are playing gaily when they're going into action,
No crowds are cheering madly at their deeds of derring-do:
They are owing small allegiance to any flag or faction—
Their colors on the sky-line and their war cry, "Put it through!"

Ahead of bath, and Bible and of late repeating rifle,
The flags can only follow to the starting of their trail;
They herd the leagues behind them, every mile the merest trifle;
They mark the paths of safety for the slower sail and rail.

They work the Quite Impossible; they scoff the earth and water—
They've solved the problems of the air and found them easy, too.
They quell the ocean's raging, the mountain's fearful hauteur.
As they march toward the sky-line with the war cry, "Put it through!"

Their standards kiss the breezes from the Arctic's cooling ices
To where the South Pole's poking out its undiscovered head;
You can see their chains a-snaking through the lands of rum and spices
And East and West you'll always find their unrepining dead.

No time for love and laughter, with their rods upon their shoulders,
No time to think with vain regret of home or passing friends.
They are slipping down the chasms, charging up the mighty boulders.
The compass stops from overwork; the pathway never ends.

They slit the gullet of the earth; disgorge its hoarded riches
(But life's too short for them to stop and snatch a rightful share);
They've a booking on the Congo putting in some water ditches;
A dating to take tea with death; they make it by a hair!

You will find their pickets watching in the unexpected places;
You will hear them talking freely of the Things-That-Can't-Be-Done;
Oh, the Faith they speak so strongly and the Hope that's in their faces—
It lights the gloom of What's-the-Use as brightly as the sun!

No bands are playing gaily and no crowds are madly cheering;
No telegraph behind them tells their deeds of derring-do:
But forward goes the legion, never doubting, never fearing—
Their colors on the sky-line and their war cry, "Put it through!"

THE CORNELL CIVIL ENGINEER

and

Transactions of the Association of Civil Engineers of Cornell University

Reprints of articles may be made by other publications, provided that full credit is given to "The Cornell Civil Engineer" and to the author of the article.

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EDITORIALS

THE ENGINEERING OF MEN

About a century ago, Robert Stephenson, one of the fathers of engineering and the son of George Stephenson, the builder of the Rocket, said: "The most difficult and, at the same time, the most important branch of engineering is the engineering of men." This statement is as true today as it was one hundred years ago. Mr. Willard Beahan, C. E. '18, in an address delivered before the joint meeting of the American Society of Mechanical Engineers and the Engineers' Club of Philadelphia with the affiliated societies said: "We have spent too much time in testing materials and work of that nature and too little time in the engineering of men. We have turned that over to the men with thick shoe soles, brass watch chains and heavy voices. The most important branch of engineering is the engineering of men and that is the branch we have turned over to other people."

In his address, Mr. Beahan pointed out that the fathers of engineering, men like the Stephensons, Captain James B. Eads and General Greenville M. Dodge, were not only expert engineers but also promoters, financiers and lawyers. These men not only designed works and made plans but they also raised the money and built their projects. That was the way our profession started. However, the engineer has drifted away from the ideals of these pioneers and, as a result, is today of much less use to the world than he should be. This drifting apart was inevitable during the early days because the development of the country was such that the profession could not possibly keep pace with it. But, it is high time we called a halt and started to regain some of the engineer's former influence in fields closely allied to engineering. Too often do we hear that the engineer does the drudgery and the promoter or development company reaps handsome profits.

It may be said that the engineer has already commenced to regain his lost prestige. For proof, we just need consider the large number of executive positions occupied by men with engineering training, and the influence which several large New York contracting corporations wield in the development and promoting sides of a modern project. But,

these examples show only a part of what the engineer can do if he once realizes that he has a heritage for which he is accountable to the fathers of engineering. If properly trained in the engineering of men, he can do more.

This naturally brings up the question, whether technical schools should pay more attention to teaching students "the engineering of men". Most schools are doing as much along this line as is practicable. Here at Cornell, we have required courses in English composition, Public Speaking, and Economics, and elective courses in Accounting, Cost Keeping and Management. This forms the basis for the training in the fields of endeavor bordering on engineering. The more advanced training can only come with years of experience. The proper handling of men can never be learned in the class room or laboratory; yet, it is as much a part of engineering as design or construction. Promoting and development work cannot be taught in one or twenty courses. It can come only with experience following a thorough training in economics and finance.

But the engineering of men is all important. In a personal letter, one of the most prominent civil engineers in this country wrote, "Another thing that you must not forget is to keep in touch with your fellow-men. He who stands aloof from contact with other beings usually does not make a success of his work because, after all, human beings are the tools with which we all work in this world, and, if we are to succeed, we must learn early that they are imperfect tools at best."

In dealing with men, we can do no better if we follow the three rules which Mr. Beahan laid down in his address. First, practice the Golden Rule—"Do unto others as you would have them do unto you". Second, care for your men. Make them satisfied and keep them from grumbling. Third, remember to carry in your heart those whom you carry on your pay roll. If every man who has men under his control, would practice these three rules honestly and whole heartedly, the prevalent unrest among workmen would be done away with, and more work and better work would be accomplished.

JOIN THE AMERICAN SOCIETY OF CIVIL ENGINEERS

Some startling information concerning the relation of the graduate from the Cornell School of Civil Engineering to his membership in national technical societies was brought to light by Mr. G. C. Brown, C. E. '06, M. C. E. '09, in an article published in our May 1922 issue and entitled: "The Cornell Civil Engineer: Where He Is and What He Is Doing." Out of a total of 1982 graduates from this School, 1163 or 59 per cent, have affiliations in one or more technical organizations. Forty-one per cent or 819 graduates belong to no technical society. Since there are so many who belong only to the Cornell Society of Engineers (formerly the Cornell Society of Civil Engineers) and therefore hold no membership in any strictly technical body, more than half of all the graduates are making their way through life without the assistance of those societies which could most certainly benefit them professionally. The diagram on the front cover presents most of the information graphically. A close study of it will reward the reader with much food for thought. If there were at hand sufficient data by means of which we could determine the exact ratio of the sum of the members of all the various societies to the total number of civil engineers in the country, it is quite probable that that figure would fall considerably below the percentage shown for Cornell men.

From the above facts, it seems that not only the Cornell civil engineer but also civil engineers in general shy at becoming members in national technical organizations. Why this is so will probably remain one of the mysteries of the engineering profession. The benefits and privileges resulting from membership are well known. One of the most important advantages of membership is the opportunity to mix with other men and to broaden one's outlook on life. The ability to mix is considered so important by successful men that they often give it as one of the prerequisites for success in life. Some of the reasons given by engineers for not becoming members in the A. S. C. E. are nothing more than excuses which are given merely to square themselves with their own consciences. Under this head fall such excuses as: "I really wouldn't get much out of the Society" or "All it does is publish technical papers which are too deep for me and which I haven't the time to read" etc. Other reasons given for not taking out membership are pathetic and the person offering them should be pitied. Consider for a minute the case of the engineer who did not apply for membership because he could not think of five members or associate members to indorse his application blank! You will agree that any civil engineer

who does not know five members of the A. S. C. E. after being out in the profession for eight years (as this engineer had) is simply wasting his time and might better take up another calling. Another reason often given is that "I'm so busy I just can't get down to it". While we have no sympathy for people, and engineers especially, who are continually putting things off we cannot help but urge them strongly in this one instance to find time and make application to the A. S. C. E. at once.

The time to get in the habit of joining good societies, like the time for forming most good habits, is in school. Since there are now student chapters of most of the national engineering societies such as A. S. C. E., A. S. M. E., A. I. E. E. at all the leading universities and technical schools of the country there is no excuse for students not becoming student members as soon as they enter in their freshman year, transferring to the junior grade after graduation, becoming associate members several years later and finally receiving the highest honor by being elected to full membership—a full membership in the A. S. C. E. being justly considered a mark of success in the engineering profession.

There are today 457 Cornell men affiliated with the American Society of Civil Engineers. This is a slightly smaller ratio than one in four. Of this total, 189 are full members, 236 associate members and 32 junior members. What are you doing, as a true Cornell Civil Engineer to help improve these figures?

THE ANNUAL BANQUET

It has become a tradition in the School of Civil Engineering for students, professors, and resident alumni to forget their worries and troubles for one evening and gather around the festive board in the wholesome enjoyment of a feast and good company. This year is to see no break in the observance of that old tradition. Plans for the Annual Banquet have already been completed. The evening before Saint Patrick's Day, March 16, is to witness the culmination of these preliminaries. Prudence Risley Hall will be the gathering place of all actual and prospective civil engineers on that evening. As in past years, a prominent alumnus has been invited as the principal speaker for the occasion.

Professor John H. Dunlap, formerly professor of Hydraulics at Iowa University and now Secretary of the American Society of Civil Engineers will also address the gathering. Several "live" student stunts will complete the program.

The banquet comes earlier in the spring term this year than ever before. This fact in itself ought to insure a large turn-out. No excuses should be offered for non-attendance at the banquet nor will any be accepted. If you are a true son of Cornell and a real Civil Engineer you know your duty on the night of March 16! Be there!

The Writing of Engineering Reports

By

NATHAN C. GROVER, M. Am. Soc. C. E.

Chief Hydraulic Engineer, U. S. Geological Survey

Next to ability in handling men, the success of an engineer probably depends more on his skill in writing clear, concise, and comprehensive reports than on any other factor. After many years in a position which necessitates the review of numerous reports by engineers engaged in both governmental and private organizations, the writer is forced to conclude that engineering schools are giving too little consideration to this important factor in an engineer's training and are thereby overlooking one of their important duties to the engineering world.

Report writing differs as much from popular writing as does mechanical drawing from works in water colors or oils. While only a few gifted persons may become noted authors or artists, it is exceptional that an engineer can not readily train himself to make creditable mechanical drawings, and similarly to prepare meritorious reports.

In writing a report the engineer should give proper attention to a study of (1) the purpose of a report, (2) the information to be included, (3) the method of presenting the information, and (4) the form of the report.

The duties of an engineer extend beyond his study of the physical features relating to an enterprise and include questions of administrations, operation, economies, and finance, and even questions pertaining to the relation of the enterprise to the community. An engineering report, therefore, may and often must discuss all these related factors on which success may depend.

Broadly, the requirements of a successful reporting engineer are:

1. To see and evaluate possibilities.
2. To formulate features of design.
3. To estimate with reasonable accuracy the cost of construction.
4. To analyze and to appraise properly the market, industrial and social conditions.
5. To prepare a clear and concise statement covering the essential features of a project.
6. To draw sound and definite conclusions.

Purpose of a Report .

Engineering reports may be divided into two classes—administrative and technical.

The object of an administrative report is to present information in regard to progress or status of investigations, development, or operation, in order that interested persons may be informed of its progress and that a permanent record may be made of the condition of the work at stated intervals of time.

A technical report may pertain to investigations

of a project, to its development, to the operations of a going concern, or to a completed structure. Its object may be to present the important facts and conclusions pertaining to the physical or financial practicability of a project or to the economics of a going concern, for the consideration of persons interested in the construction, operation, financing, or control of the enterprise; or the report may be made primarily to record permanently the information obtained.

Information to be included in a Report

An administrative report should contain statements in regard to personnel, finances, progress of work, and like features, or to the factors and conditions affecting these features. If lengthy discussions of details are necessary, they should be presented in separate reports or appendixes.

Technical reports should contain statements of the technical and related features of the project or development and the conclusions derived from the statements. Every report should include—

1. An introduction stating the object of the report and giving a general description of the project or development and the sources of information.

2. A presentation, in the body of the report, of all important facts necessary to show the physical characteristics, feasibility, and estimate cost of the project, and its value when completed, as well as the elements of stability or of the risk involved, the nature of the presentation depending on the character of the enterprise. Complete statements relative to all factors affecting the project or development should be given, together with sufficient information to indicate the reliability of the data on which the conclusions rest.

3. The conclusions should show concisely the results of the analysis of the data presented in the body of the report and the recommendations based on those conclusions. The report should be dated and signed on its final page, or a dated letter of transmittal, bearing the signature of the author, may be prepared.

Each report should include a title page, a table of contents, a list of illustrations, a list of tables, if necessary, and, if the report is long, an index. Long reports should be prefaced with an abstract of not more than two pages presenting the salient facts and conclusions. Related data or discussions not essential to a clear understanding of conditions but necessary as a basis for statements made in the report or for a detailed and critical analysis should be presented, if at all, in appendixes instead of in the body of the report.

As a basis for writing a report, an outline should be prepared and, to guard against omissions in estimates, a drawing of this or a similar enterprise showing every possible variation should be followed.

Methods of presenting information

Information can be presented in three forms—text, tables, and illustrations.

All data to be used in the report should be carefully studied in order to determine which of these three forms affords the clearest and best method of presentation. Choice should be made primarily from considerations of conciseness and clearness, but the ability of the probable readers of the report to understand one or the other of these forms must also be considered.

Text.—The matter of the text should be presented in logical order and in simple and concise language. It should be divided into topics designated by center and if necessary by side headings under which the matter should be appropriately divided into paragraphs. References to information outside the report or to authorities cited should be made by footnotes. Citations of data within the report should be made by cross references, giving page numbers. Direct quotations should be exact as to wording, but errors in punctuation and other obvious printer's errors should be corrected. Proper credit for quotations, either direct or indirect, should be given in the text or in footnotes.

Tables.—Tables offer a convenient and effective method of presenting statistical data and may also be used to present facts that are common to several units or groups, in order to disclose common or special characteristics or to make desirable comparisons. For example, the industrial or other features of the cities of a State may be presented more effectively by grouping them in tables under appropriate headings than by describing them in text.

All headings for tables should be clear and concise. There may be a choice not only as to the wording of headings of columns but as to their grouping as side heads or top heads. A proper choice of these headings may make it possible to combine two tables in one, or to present a table in more condensed and convenient form. A transposition of side and top heads may improve a table both in appearance and in clearness.

Each table should have an appropriate title and in some reports the numbering of tables may increase the ease and definiteness with which references may be made to them.

Illustrations.—Illustrations may be used to amplify the text or tables or as an independent means of presenting information. In general, they may be grouped in two classes—photographs and drawings. Photographs may show either general features or details of specific features. Drawings may be used to present data graphically or plans of features of the work, or, as maps, to show the locality and the

positions of important features. A number and appropriate title should appear immediately below each illustration. The title of a photograph should always include the date on which it was taken.

Form of a Report

All material in the report should be bound in regular book form. The first impression made by a report—a result of its general appearance—may determine its effect on the reader, and the ease with which it can be handled, read, and studied—a result of its general arrangement and make-up—may determine to a large extent its value and usefulness.

The manuscript should be typewritten on letter paper, with liberal margins and preferably with no visible corrections either by typewriter or pen. Except for quotations and tables, which may be single spaced, the lines should be double spaced. Pages should be numbered in the upper right hand corner. Tables and illustrations should be inserted in the text at or immediately after the place of first reference to them.

Not only the title page but the first page of text should bear the title of the report and the name of its author. A blank page should precede the title page and follow the last page of the report.

So far as possible, tables and illustrations should be reduced to the size of a page. If this is impossible, the sheet should not exceed twice the height of the page, as only one horizontal fold can be conveniently handled in a bound report. The length, however, is not thus limited as the bellows system of folding permits the ready use of several vertical folds.

So far as possible all drawings should be bound in the report but large sheets that must be folded horizontally more than once may be more conveniently used if placed in a pocket portfolio accompanying the report. A careful study of scales and a proper arrangement of matter may enable the writer to present information on sheets that may be bound in the report. Under no consideration should rolls of drawings accompany a report, as they are inconvenient both for handling and filing.

NOTE.—The following publications will be found of special assistance in connection with report writing:

Style Manual of the Government Printing Office.

Suggestions to Authors of papers submitted for publication by the U. S. Geological Survey with directions to typewriter operators.

The Preparation of Illustrations for reports of the United States Geological Survey.

Charles M. Chuekrow, '11, care of Fred T. Ley Co., Inc., 19 West 44th Street, New York City, is now in charge of employment service for the Cornell Society of Engineers and Director Barnes, '97, is handling the Ithaca end of the work. Both experience the greatest difficulty in finding the men best fitted for the job offered and believe that it would often be possible to put graduates in better positions if they knew more fully the qualifications and desires of the individuals.

The Navy's Relation to Commerce and Industry

By R. R. M. EMMETT

Lieutenant Commander, United States Navy

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The people of the United States are today confronted with their destiny and that destiny lies in great measure on the sea.

The young man of ambition has a different picture presented to him as he goes out into the world, than had his father or his grandfather before him.

For three-quarters of a century the most attractive careers for each rising generation lay at home. Ours was a country of boundless natural resources, of noble opportunities. There was no limit, other than a man's ability, to what could be accomplished at home. Our relations, both political and economic, with the world abroad were extremely simple. There was no economic demand that our people should go down to the sea in ships, and hence we have had no merchant marine worthy of the name. Having no merchant marine to support and secure, our Navy waned to a nominal force, largely composed of old and obsolete ships. It was natural that this should be so. There were no political or economic reasons for maintaining a greater force.

As the country discovered and developed its great natural resources and grew rich and prosperous, men of vision here and there, all over the country, foresaw the need of securing our prosperity. A start was made toward the creation of our modern Navy. Men preached the need of developing merchant shipping to transport our products throughout the world.

Early Progress

Progress was necessarily slow. Opportunity to live comfortably ashore abounded, and men were slow to earn their bread at sea.

The Spanish-American war, with its aftermath of new interests and responsibilities, pushed on our

naval development. The manifest need of securing the Monroe Doctrine from the selfish assaults of foreign powers continued the expansion of our Navy.

The application of the Monroe Doctrine has successfully safeguarded, for one hundred years, the affairs of this hemisphere from complications that might have threatened the peace of the world. It

has permitted the people of all nations in the two Americas to work out their national problems without interference or exploitation from abroad.

The outbreak of the World War plunged us, whether we would or not, into the turmoil of world affairs. We have emerged from that conflict, for the present at least, the richest and most influential nation in the world. Whether we are to maintain our present relatively happy position in the family of nations rests with ourselves. There can be no doubt but that the genius and industry of our people, the soundness of our political and economic institutions, will enable us to bear prosperity as well as we have supported and borne the strife for pros-

perity. We must, however, take stock for the future.

We have a large and increasing population, a great portion of which has assumed a highly industrial character. Our natural resources have been pretty well discovered, are in the course of development, and can be accurately estimated. If the standard of living of our people is to be preserved, if we are to be fed as American citizens have been fed in the past, we must make better and more scientific use of both our industrial and agricultural resources. Our home markets now, with the passage of the years, approach the saturation point. It is becoming increasingly imperative to produce more goods than we can absorb at home. The building up and de-

STUDY SEAPOWER

Young men launched into the world today face a new perspective. The United States stands as a world power. Its commerce carried in American ships, manned by American citizens, secured by an American Navy, second to none, will traverse the seven seas.

I know nothing more important to commend to the minds of our young men than, first, to study the inevitable influence seapower will exert on their country's future economic development; and then, to translate convictions gained into deeds which will react to the security, prosperity, and happiness of our great Republic and its people.

Very sincerely,





Destroyer Laying Down Smoke Screen

velopment of foreign trade and commerce is becoming an essential to our future economic prosperity.

Mexico and the countries of Central and South America are, figuratively speaking, at our doors. Great opportunities await men of ambition, brains and energy in China, Central Asia, the Near East and in Africa.

If our young men go out into the world to compete for the business of the world, they must be served by American ships. If they are served by the ships of other nations, our competitors, they must pay a toll to those foreign ships. If for a time, in spite of that, they are successful, we cannot complain if other nations who control the sea transportation of the world meet our success by taking advantage of such control to prevent our goods from moving about the world with the necessary precision as regards time, amount and place. We must develop our own merchant marine. We can and will develop our own merchant marine.

Merchant Marine and History

The history of the world can be analyzed and resolved into a few fundamental principles. History invariably has repeated itself and will again. No nation has ever built up a seaborne trade and commerce unless the ships that served that trade were supported and secured by an adequate naval force.

Admiral Mahan in his two great books entitled,

"The Influence of Seapower on History", and "The Influence of Seapower on the French Revolution and Empire", traces with matchless clarity the political and commercial development of the Europe we know today. Their contents are being applied by the statesmen of Europe. The history of the Japanese Empire in the past twenty-five years has been substantially guided and influenced by their existence. The principles adduced and analyzed are particularly applicable to our own country, a country that seeks wealth, prosperity and consequent happiness, not by the sword, but rather by honest, industrious labor.

Merchant Marine Must be Studied

We in the United States have been accustomed to give little thought to our need for a merchant marine, or, if we have considered it at all, only as something seen dimly, in the distance. We have been accustomed to think of our Navy as our strong right arm, as our bulwark in time of war, but as something in time of peace that was necessary, we supposed, but still required a heavy expenditure of the public funds that might be spent elsewhere to more apparent and immediate advantage.

We must revise our ideas; we must renew our perspective. The economic need for seapower is upon us, and by seapower I mean a fleet of American

(Continued on page VIII)

Some Influences of the Railroad in the City Plan

By EVERETT E. KING, M. C. E. '11

Professor of Railway Civil Engineering, University of Illinois

In influencing the development of most of our American cities and towns, especially those in the western states, the railroad was a pioneer. In most cases the towns grew up near the railroad track and adjusted themselves to the right-of-way. This, of course, led to grade crossings where the streets and highways crossed the railway line. Every city and town appreciated to some extent, at least, the benefits to be derived from the railway, and in many cases they gave them the use of the streets and offered them other inducements to locate there. The need for grade separation was not urgent in those early days because traffic was light and it moved comparatively slow. Even if the need of it could have been foreseen, the effort and expense that would have been involved to separate grades during the original construction of the railroad would have been in most cases prohibitive. While everyone must realize that the railroad has been one of the principal factors in promoting the growth of our cities, he must recognize that the grade crossings in those cities are barriers to street traffic. Thus we find in many cases, especially among the smaller towns, that the growth is all on one side of the right-of-way. The principal business and residence sections will continue to grow on that side unless constrained by another cause.

Railroads and Suburban Service

As both railway and highway traffic increased in density there appeared the necessity of separating them. From an economical viewpoint the problem has been met in many of the larger cities and towns by elevating the tracks of the railroad company. In order to eliminate as much expense as possible during this process of reconstruction and to reduce to a minimum the danger and cost of operation on account of bridges on the line, many of the streets were closed across the right-of-way. While the embankments thrown up for the elevated roadway eliminated most of the dangers of the surface crossings, they interfered to a certain extent with the street and foot traffic, and in many cases proved a hindrance of the normal growth of the town and city. Elevating the tracks intensified the noises attending train operation on account of the elevation itself and on account of the bridges installed to provide openings for the movement of street traffic. As the tracks were elevated, the noise, which was to a certain extent confined by the buildings adjoining the right-of-way, was given a wider range.

In the early days of the city development the

largest industries located on the railway tracks where they could get the benefit of car-load delivery without involving wagon haul. This eliminated one additional handling and the wagon transfer. Besides, the industry could provide better appliances for loading and unloading at its own plant than it could on a public team-track. This condition has created an industrial zone along portions of the railway lines that is undesirable for residential purposes and that has a tendency to sectionalize the city. Furthermore, where these industries have taken large tracts of land, public transportation through them is practically prohibited. This whole arrangement together with the attendant smoke from the railroad and its fostered industries has made the neighborhoods immediately adjoining the right-of-way rather undesirable residential sections as anyone can testify who has viewed them from the windows of the passing train. This voluntary grouping of these activities into an industrial belt for economic purposes does, however, have its advantages and provides a logical basis for zoning. As these industries are fundamental for the city's growth, grouping them into a common area does, to that extent, leave the other regions undisturbed for residential purposes.

Railway and Highway Traffic

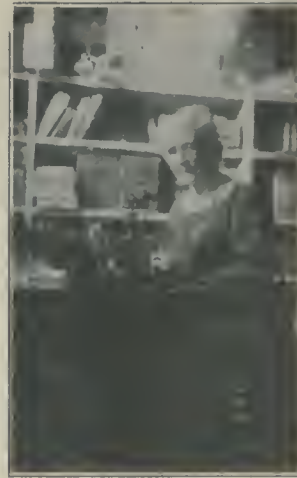
More and more are the railroads called upon to handle suburban service. As the population of the city increases and as the value of property becomes greater and the noise, smoke and dirt more offensive, there follows the natural tendency to seek for those more pleasant quarters that are found in the suburban towns. As a large portion of these suburban dwellers must rely upon rapid transit, they must locate along the railroad to get it. Later, local rapid transit lines may follow, but not until the community is sufficiently established to warrant it. Examine the outlying districts of any city and you will find that they radiate out along the railroad lines. Along these lines are settlements clustered around the stations from ten to fifteen miles from the city's center, sometimes built up between and sometimes not. Many of these places grow up without any particular supervision, and as the city expands they become a part of the one great unit with all the evils and disadvantages they may have due to a lack of coherence and systematic planning. Many of these places, on the other hand, that are properly planned take pride in civic construction and become valuable assets to the city that absorbs them.

In the case of the railroad crossing the city as a surface-line, there enters the question of the proper location of the freight station. If the freight house with its attending yards lies near the central downtown district, many streets are generally closed just at the point where the traffic congestion becomes serious. These streets are closed because of the size of the buildings and the amount of track space required for the yards. These stations create industrial centers of their own, and on that account they seriously interfere with cross-town traffic at a point where it tends to concentrate. It is on account of these conditions that serious consideration is being given at the present time to the question of moving the freight house away from the central district into territory less congested. This would permit the streets heretofore closed to be opened and would relieve the situation accordingly.

The opinion prevails in railroad circles that passenger stations should be located as nearly as possible in the down-town section in the case of the largest cities. This arrangement is desirable from many viewpoints, but it does lead to further sectioning of the city in the cases of surface-built or elevated lines and it does tend to further congestion of streets otherwise taxed well up to their capacity. In many instances a number of the roads have combined their interests and have thus built larger terminal plants and in other cases all have combined in the union station plan, an arrangement which provides convenience for the traveling public and which affords opportunities for more elaborate designs. These railroad stations, if established in the early days of the city's growth, may be used as civic centers from which to develop radial streets and important lines of travel. As the railroad station is, in general, one of the criterions by which the traveling public judges a city or a town, it is fitting and appropriate that such structures and grounds should be as artistic and elaborate as the service warrants; besides, they typify the soundness and stability of the railroads which they represent. No American citizen can fail to be proud of these institutions as he passes through them even though in many cases he may realize that they exist at the sacrifice of other portions of the service. While these terminals, used as they are by the traveling public, are bound to have a wide influence in stimulating higher ideals in the public mind, the results in general may be more or less intangible. In the immediate neighborhood of these improvements, however, the influence is more readily seen. Gradually the surroundings begin to amend. Some of the old buildings are enhanced and others are replaced with new ones. Streets are improved and parks are developed in sympathy with the new surroundings. Little by little the influence spreads until in time even the humblest home may show evidence of a keener sense of civic pride.

MRS. CRANDALL RECEIVES GIFT

Mrs. C. L. Crandall will be remembered by Cornell graduates in Civil Engineering as the wife of the late Prof. C. L. Crandall, C. E., M. C. E., Pro-



fessor of Railway Engineering and Geodesy at Cornell for many years. Mrs. Crandall still lives in Ithaca at their old home at 408 Hector Street, and still continues to take an active interest in all the affairs of Lincoln Hall, particularly in the successes of the old graduates.

Recently Mrs. Crandall has been the recipient of an unique gift in token of the friendship of some of these alumni. A group of

some 20 of them, most of them of the class of '01 or earlier, have presented her with an excellent radio receiving set. Professor H. N. Ogden kindly acted as representative of the alumni in the purchase and presentation of the gift. He was fortunate in enlisting the aid of a student, D. W. Exner of Elmhurst, N. Y., who holds a commercial radio operating license, and who has built and operated a number of sets of great variety. It was thus possible to purchase the individual units and assemble them here and so secure a receiving set of exceptional quality.

At the present writing the set has been assembled, tried out, and is about to be transferred to a position in front of the fireplace in Mrs. Crandall's sitting room.

FACULTY NOTES

Professor F. J. Seery is on Sabbatic Leave for the second term of 1922-1923. Prof Walker is giving Water Supply 230.

Professor W. L. Conwell is also on Sabbatic Leave for the second term. Highways 265 is being given by Prof Perry. Prof. Conwell represented the School of Civil Engineering at the Annual Road Show held in Chicago during January 13 to 20.

Professor H. N. Ogden represented the School at the Annual Meeting of the American Society of Civil Engineers held in New York City, January 17, 18 and 19, 1923. He also attended the Annual Banquet of the Cornell Society of Engineers as the School's representative.

Mr. L. W. Wallace, Secretary of the Federated American Engineering Societies and principal speaker at the Joint Meeting of the Student Chapters A. S. C. E., A. S. M. E. and A. I. E. E. held on February 19, 1923 was the guest of Professor Seofield during his stay in Ithaca.



SCHOOL NOTES

C. E. REGISTRATION

This term the School of Civil Engineering lost thirteen men by scholastic failure; five seniors, five juniors and three sophomores. There were also one or two lost by transfer away and two or three by leaves of absence. We have one new student, seven transfers from other colleges of the University and five returned "bustees". The changes in freshmen registered for C. E. are as follows: four dropped, seven new students, one returned, one transferred in and one transferred out.

It is interesting to note from the above that, while several transferred to Civil Engineering, only one or two left. This would seem to reflect great credit on the methods of instruction and upon the spirit of fair play which prevails in the School of Civil Engineering.

THE CORNELL CIVIL ENGINEER extends a welcome to new arrivals and to those who have returned. To the unfortunates, all we can say is, "Tough luck; see you next fall."

JOINT MEETING OF THE A. S. C. E., A. S. M. E. AND A. I. E. E. PROVES GREAT SUCCESS

Mr. L. W. Wallace, Secretary of F. A. E. S., addresses the first joint meeting of the three chapters, held under the auspices of the A. S. C. E. Student Chapter

On Monday, February 19, at eight o'clock, the Cornell Student Chapters of the A. S. C. E., A. S. M. E. and A. I. E. E. assembled in joint meeting at Sibley Dome. F. E. Spurney, '23, President of the A. S. C. E. Student Chapter, opened the meeting with a few remarks of the advantages of joint meetings and the need for future cooperation among the three Student Chapters.

The main speaker of the evening was Mr. L. W. Wallace of Washington, D. C., Secretary of the Federated American Engineering Societies. Mr. Wallace is a national figure in the field of engineering and is constantly in touch with problems confronting the engineering profession. He spoke concerning these problems and their solution.

Mr. Wallace pointed out that the world is depending more upon the engineer at the present day than ever before in history. The coming generation of engineers, he went on to say, will be a primary factor in the solution of great world problems of readjustment and therefore opportunity in the engineering field is unlimited. Specific problems were touched upon; problems of transportation, industrial management and especially humanization of industry—making working conditions safer and healthier for the workers. Mr. Wallace showed how the change in industrial conditions, due to specialized machinery and seasonal employment, had brought about waste and social unrest. Leaders of industry, he said, were making the great mistake of overlooking the human element.

Mr. Wallace also spoke of the work of the F. A. E. S. Two steps which this organization has already made are the report on the twelve hour day and investigation of industrial waste. Interests of national surveys have also been furthered.

After Mr. Wallace's address, the Glee Club Quintet sang several of the songs that they sang during Junior Week. Bruce Evans, '23, of the Savage Club, also gave a very humorous monologue. At the conclusion of the meeting in Sibley Dome, the engineers adjourned to the basement for refreshments and informal discussion.

(Continued on page 73)

ALUMNI NOTES

'88. Charles W. Curtis is statistician for the Sill Stove Works, 524 Oak St., Rochester, N. Y. His home address is 17 Melrose St., Rochester.

'91. Dr. W. Kendrick Hatt, Director of the Advisory Board on Highway Research of the National Research Council, presented a paper entitled "Immediate Tasks of Highway Research" before the Annual Roadbuilders Convention at Chicago in January.

'93. Harry T. Cory is a Consulting Engineer with an office in Los Angeles. He resides at Redondo Beach, California.

'94. Joseph C. Besosa is with the firm of Higuera and Besosa, Engineers and Contractors, Santurce, P. R. His residence address is 191 Loiza Road, Santurce, P. R.

'94. Ira J. Coe is a Consulting Engineer, his office being located in the Mills Building in San Francisco. His residence is at 67 Santa Clara Ave., in the same city.

'94. Noah Cummings is a civil engineer with the City Department of Plant and Structures, New York City. His address is 457 Dunham Ave., Mt. Vernon, N. Y.

'97. Homer F. Cox, Supt. and Chief Engineer of the Seranton Gas and Water Company, now has his home at 430 Colfax Ave., Seranton, Pa.

'02. George J. Davis, Jr., is Dean and Professor of Civil Engineering at the University of Alabama. His home address is Pinehurst, Tuscaloosa, Alabama.

'05. William B. Freeman is Branch Manager for the Lock Joint Pipe Company, his office address being 311 Engineers Building, Denver, Colorado.

'07. Warren E. Darrow is now a member of the firm of Talman and Darrow, Consulting, Designing and Inspecting Engineers, with offices at 205 Colorado Building, Washington, D. C. His address is 1423 Webster St., N. W., Washington.

'08. Major Edward A. Wood is City Plan Engineer in full charge of the preparation of a city plan for Dallas, Texas. He resides at 3700 Malpewood Ave., Dallas.

'08. Dudley L. Lewis is City Engineer for the city of Fort Worth, Texas, with offices in the City Hall.

'09. Arthur W. Harrington was appointed District Engineer of the U. S. Geological Survey, Water Resources Branch on July 1st. His office is at 704 Journal Building, Albany, N. Y.

'09. Clarence T. Seipp and E. L. Lonergan announce the partnership of Seipp and Lonergan to succeed the Mueller Construction Co., 179 W. Washington St., Chicago, Ill.

'10. Howard T. Critchlow occupies the position of Hydraulic Engineer in the Department of Con-

servation and Development in New Jersey. He is living at 577 Rutherford Ave., Trenton, New Jersey.

'10. Edgar R. Crofts is now Purchasing Agent for the Rochester Gas and Electric Corporation, and has moved from his former home in Hanover, Conn., to Rochester, N. Y., where his present address is 101 Vermont St.

'10. Wilmer A. Dehuff is Principal of the Baltimore Polytechnic Institute. He resides at 203 East Thirty-second St., Baltimore, Md.

'11. Ralph S. Crossman is teaching engineering drawing in the University of Illinois. His address is 708 W. Green St., Urbana, Ill.

'11. Rafael A. Gonzalez, Chief Engineer of the Isabela Irrigation Service, had an article in the Engineering News-Record of Jan. 25, 1923, describing some novel features of the project under his supervision.

'13. Alexander Lyle, Jr., is Resident Engineer for Booth and Flinn, Ltd., and is in charge of field work for his firm on its contract for the Hudson River Vehicular Tunnel. His address is 61 West 50th St., New York City.

'13. Frances M. Dawson has the position of Associate Professor of Hydraulics in the Engineering College of the University of Kansas.

'15. Gerald F. Healy is Sales Manager and Matthew Carey is Realtor with the G. A. Kelly Co., Real Estate and Construction, with offices in the Genesee Bank Building, Flint, Michigan.

'17. Donald G. Davis is a member of the firm and also General Superintendent of the Municipal Construction Co., 78 Utica City National Bank Building, Utica, N. Y.

'17. Francis R. Molther is now with the E. P. Platt Bros., Architects, 680 5th Ave., N. Y. He lives at 143 E. 39th St.

'17. James F. Driscoll is with the United Erecting Co., of Cleveland. His mail address is 1950 E. 90th St., Cleveland.

'19. Chilton A. Wright is Assistant Hydraulic Engineer with Sanderson and Porter, N. Y. He lives at 10 Woodbine Ave., New Rochelle, N. Y.

'20. Gerald C. Williams was recently discharged from the Air Service, and sailed on January 9th on the "Resolute" for a trip around the world, accompanied by his cousin. His future plans are to make the trip by air.

'21. Edwin F. Chobot has joined the staff of the Converse Bridge and Steel Co., at Chatanooga, Tenn., as a designer.

'21. Donald G. Coekeroft is in the Commercial Engineering Department of the New York Telephone Company at 15 Dey St., New York City. In the same

office are also George H. S. McNair '18, and Paul I. Van Valkenburg '20.

'22. Louis S. Amreich is a rodman with the Board of Estimate and Apportionment of New York City, and has been engaged on the surveys for the proposed Brooklyn-Staten Island Tunnel.

'22. Wells H. Ashley has accepted a position with the New York Central Railroad at Oswego, N. Y. His mailing address is 127 West Seventh St., Oswego.

'22. George I. Brayman is engaged in power house construction at Ronceverte, West Virginia.

'22. Rex A. Daddysman is an engineer with the Steel Form Contracting Co., in San Francisco. After receiving his degree in September, he made the trip from Ithaca to the coast in 25 days of steady travelling. His new residence address is 4529 California St., San Francisco, Cal.

'22. James Hannigan is now Assistant Field Engineer with the firm of Sanderson and Porter on the construction of a steam power plant at Williamsport, Maryland. His present address is the Central Y. M. C. A., Hagerstown, Md.

'22. Frederick O. Schreiner and Barnard S. Sines are with the Illinois Central Railway at 1201 South Michigan Ave., Chicago, Ill.

'22. Howard E. Whitney has left his position as Materials Lab. instructor here and now has a position with the Susquehanna Power Company. His mail is to be addressed in care of the Company, Conowingo, Maryland.

SCHOOL NOTES

(Continued from page 71)

FUERTES GOLD MEDALS

The Fuertes gold medals are of a value of fifty dollars each and are awarded annually under the following conditions:

The undergraduate medal "will be awarded annually to that student in the School of Civil Engineering who may be found at the end of the first term of his senior year to have maintained the highest degree of scholarship in the subjects of his course; provided he has been in the University for at least one and one-half years."

The graduate medal "will be awarded annually to that graduate of the School of Civil Engineering who may write a meritorious paper upon some engineering subject tending to advance the scientific or practical interest of the Profession of the Civil Engineer."

The paper will be presented on or before April 15. If a paper is presented in printed form, it will be received only provided it has not been published earlier than the preceding April 15.

Last year, the undergraduate winner of this prize was Frank Ellsworth Conkling, Jr., the graduate

(Continued on page VI)

In Memoriam

Charles B. Wolfe '24

The body of Charles B. Wolfe, Jr., was recovered from the Delaware River off Pier No. 3, Philadelphia, on January 13th. It is the belief that young Wolfe accidentally fell from the pier on the night of the 11th, while bailing out and repairing the machinery of a power boat.

Wolfe entered the University in 1920 pursuing a course of Civil Engineering. While here, he distinguished himself as an expert swimmer. He was twenty-two years old.

Harry E. Stovall

Captain Harry Eldridge Stovall was killed on December 31st, when a plane, which he was piloting, fell to earth in a nose-dive, about seven miles south-east of Mexia, Texas. Stovall was born on January 17th, 1895, and entered Cornell in 1916, in the Civil Engineering College. He enlisted in the Aviation Section of the Marine Corps, soon after war was declared, receiving his training at Quantico, Va., and Miami, Fla. He was in the fight at Chateau Thierry, and Belleau Woods, and was in Tournai, Belgium, when that city was occupied by the Allies. He was one of the men picked for the North Bombing Squadron, which was preparing to fly over Berlin, to bomb that city, when the Armistice was signed. He was married on Feb. 16th, 1916, to Miss Ellen Mary Lawler of Washington, who survives him, with two children.

CHANGES OF ADDRESS

- '87 L. F. Bellinger, Lt. Comdr. C. E. C.—from New Orleans, La., to U. S. Submarine Base, New London, Conn.
- '94 '98 C. W. Comstock—from Denver, Col., to c/o Dwight P. Robinson & Co., Inc., 125 East 46th St., New York City.
- '95 C. H. Kendall—from Austin, Texas, to County Highway Engineer, Sugar Land, Texas.
- '96 D. H. Dixon—from Great Neck, L. I., to 204 West 86th St., New York City.
- '99 A. P. Adair—from Indianhead, Md., to 51 Glen Cove, N. Y.
- '13 R. T. Kerby—from 1019 Kenmore Place, to 322 Linden Ave., Brooklyn, N. Y.
- '14 L. I. Zagoren—from Charlotte, N. C., to Graham Beach, Staten Island.
- '15 T. M. Stuart—from Troy, N. Y., to 149 Sumner Ave., Springfield, Mass.
- '19 J. E. Prettyman—from Durham, N. C., to c/o State Highway Commission, Kings Mountain, N. C.
- '20 W. O. Manchester—from Nassau, N. Y., to 202 Burke Bldg., Seattle, Wash.

SCHOOL NOTES

(Continued from page 73)

who presented the most meritorious paper was Wilson G. Harger '09. He presented a paper on "Location, Grading and Drainage of Highways".

It behooves the undergraduate to keep in mind this prize not only for the benefit which he, himself, may derive from it, but because of the honor which he may bring to his Alma Mater. So too in the case of the alumnus who wins the graduate prize. Honor is not only brought to Cornell, but a service is done to the Civil Engineer's Profession. And so, let the undergraduates in the School of Civil Engineering act accordingly and maintain as high a standard as possible. Let our Alumni put forward their best efforts in the writing of papers on engineering subjects. In so doing, they will be performing a great service to the engineering profession as a whole.

MR. PAUL LINCOLN

School of Electrical Engineering Welcomes New Director

Mr. Paul M. Lincoln, recently appointed Director of the School of Electrical Engineering, graduated from Ohio State University in June, 1892, with the degree of M. E. in E. E. Electrical engineering has

been his life work. Mr. Lincoln has served in an engineering capacity chiefly with the Westinghouse Electrical and Manufacturing Co. and with the Niagara Falls Power Co.

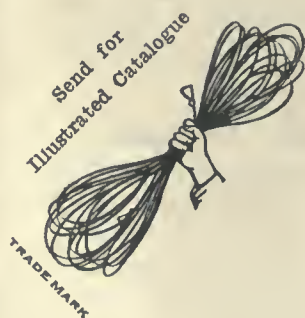
For seven years he had charge of the "Power Division" of the Westinghouse engineering department. In 1910 he was appointed general engineer of the Westinghouse Company, and remained in that capacity until his resignation in 1919. From 1911 to 1915, Mr. Lincoln acted as head of the electrical school of the University of Pittsburg while still carrying on his work with the Westinghouse Co.

Mr. Lincoln has for many years taken an active interest in the affairs of the American Institute of Electrical Engineers. For five consecutive years (1909-14), he served as Chairman of the Sections Committee and, in 1914-15, he served as President of the Institute.

The synchroscope, which Mr. Lincoln invented in 1902, is a device that has come into universal use wherever alternating current machines are paralleled. He was awarded the John Scott Medal for this invention by the City of Philadelphia.

Mr. Lincoln brings to his new position a practical engineering experience of nearly thirty years, wide connections in the engineering world, and that balance, sound judgement, tact, optimism, and human

(Continued on page VII)



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SCHOOL NOTES

(Continued from page VI)

sympathy which are well known to all who have come in contact with him. The College of Engineering of Cornell University is to be congratulated upon obtaining his services to guide its electrical faculty and students.

C. E. BASKETBALL

Under the efficient direction and advice of Professor Seofield, C. E. athletics have gained a new impetus. The basketball team has excellent prospects of gaining high honors in the Inter-college league race. During the past term the men have responded faithfully to the pleadings of the manager and faculty adviser. Practice has been held nearly every week, more than enough men for two teams usually showing up. The spirit of these men who are willing to help the team along by practicing with them is greatly appreciated.

To date the C. E. team ranks third in the league, M. E. (last year's champions) and Arts leading, neither team having been defeated. C. E. has played five games, winning four of them and losing to M. E. in a hard fought, clean game. There are still two games to be played this term, one with Arts and one with Ag. The Arts game, postponed from last term, is scheduled for

(Continued on page VII)

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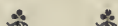
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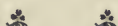
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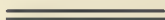


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SCHOOL NOTES

(Continued from page VII)

Another laudable feature of this basketball season is the support from the side-lines which the team has been getting at nearly every game. A large group of C. E. men have attended the games to back up the team and cheer them on. Backing of this sort is what makes a winning team.

Without doubt the games between Arts and M. E. and Arts and C. E. will be the deciding games of the season. The C. E.—Arts game will probably be played shortly after the C. E.—Ag game. It is therefore exceedingly important that the players get as much practice as possible before the Ag game. The following men have been working faithfully and are expected to give their best in the next two games: Adler, Barasch, Burg, Crawford, Kohm, MacWilliams, Mains, Palmer, Skinner.

Success is not up to these men alone, however. We, on the sidelines, must give our support in whatever capacity we are best able. In Professor Seofield we have an excellent athletic adviser, a man who takes an active interest in the School's athletic activities. Much of the team's success is due to his persistent efforts. Let us all give him our best support and help put C. E. at the top in Intercollege athletics. Remember—Those trophy shelves in the Library are nearly all empty. Let's fill 'em up!

Following are the scores of the games already played:

C. E. 29—Arch.	11
C. E. 13—Chem.	11
C. E. 10—Law	9
C. E. 19—M. E.	28
C. E. 2—Vet.	0 (forfeit)

At this writing the league standing is as follows:

	Won	Lost
M. E.	5	0
ARTS	3	0
C. E.	4	1
AG.	3	2
VET.	2	2
ARCH.	0	4
LAW	0	5

THE NAVY'S RELATION TO COMMERCE AND INDUSTRY

(Continued from page 68)

owned, American manned ships, running from great commercial points to the ends of the world and back, supported and secured by a Navy trained to the razor edge of efficiency and second in power to none other on earth.

Nothing is more important to the future interest of the United States than a thorough realization by the rising generation of the great influence seapower will inevitably exert on their prosperity and happiness.

THE CORNELL CIVIL ENGINEER

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VOL. XXXI, No. 7

APRIL, 1923



THE SLUMP TEST

Note the frustum of a cone 4" in diameter at the top, 8" at the bottom, and 12" high, used for making this test.



Silver for Hiram of Tyre

Hiram of Tyre was the metal king of the world in the tenth century, B. C. From Spain, his fleet brought back every third year the entire production of what is now the Rio Tinto Mine.

Three tons of silver a year was all that 40,000 workmen could produce in Hiram's time. In a recent year, at the same mine, 9,000 men, with the aid of explosives, mined $2\frac{1}{2}$ million tons of ore. From this ore, almost 30,000 tons of copper alone was obtained.

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THE CORNELL CIVIL ENGINEER

and

Transactions of the Association of Civil Engineers of Cornell University

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Vol. XXXI

APRIL, 1923

No. 7

EDITORIALS

WITH THIS ISSUE

With this issue the present board of Editors and Managers relinquishes control of the Cornell Civil Engineer. The magazine from now on will be published by men from the class of 1924. Elections to the various offices on the staff will be announced in our next issue.

It is with not a little regret that we see the control of the magazine passing out of our hands to others, not because we have fears for its success, but rather because it is hard to break away from the harness in which we have worked for the past three years.

We like to think that the Cornell Civil Engineer is a little bit better because of our association with it. Whether or not it remains for our readers to decide. What improvements have been made, were made possible due to the helpful cooperation of our Alumni who have this year been most generous with financial and other support.

To the 1924 Board of Editors and Managers we wish success.

The 1923 Board

ELECTIONS

Now is the time for all students in the School of Civil Engineering to think of possible candidates for the annual election of officers of the Association and for the C. E. Honor Committee. As is the custom of most organizations on the Hill, these elections take place in the spring in order that the men elected might have a period of one or two months to "learn the ropes" before the opening of the new college year.

The election of officers of the Association of Civil Engineers, which is also the Student Chapter of the American Society of Civil Engineers, will take place at the regular May meeting, Monday, May 7. The officers to be elected are president, vice-president, secretary, student athletic director, and faculty athletic director. No treasurer is elected since, by the terms of the Constitution, the business manager of the Cornell Civil Engineer is automatically the treasurer of the Association. All nominations are by pe-

titions signed by at least twenty men. The petitions must be handed in to Miss Lynch or to one of the present officers of the Society at least one week before the meeting.

Election of the C. E. Honor Committee will take place during the week of May 14. Nominations for positions on this committee are also by petition. Four men from the class of 1924, three from 1925 and two from 1926 are to be selected. The man polling the highest number of votes from the 1924 class is the chairman of the committee. No freshmen are elected until next fall when the committee will select from the class of 1927 one man who intends to elect civil engineering in his sophomore year.

The petition system of nomination was inaugurated in order to insure a careful consideration of candidates. Too often in scholastic organizations a man is elected to office merely because of his reputation in athletics and not by reason of any personal ability as an officer. Poor judgment in elections is in all ways detrimental to the standards of the organization. For the best interests of the Association, it is the duty of each individual student to decide on the question of candidates with a great deal of care. Enjoy a little politics. Think over the men you know. What offices would they fill successfully?—then pick out the best men and see that they are nominated.

WHAT IS S. P. E. E.?

All undergraduates now know that there exists a Society for the Promotion of Engineering Education, because the Cornell Daily Sun, read regularly at the breakfast table, announced that such a society was going to hold a convention at Cornell this June. We wonder how many undergraduate engineers have a definite idea of this society—what its aims are, what its accomplishments are—what it is? Wouldn't the percentage of students with a really clear and lucid idea of the character of the society be somewhere in the decimal of a per cent of the total engineering student body.

Yet shouldn't the young engineer have a clear

and concise conception of the S. P. E. E., or any other national engineering society of which he is a potential member? Is it not for his own welfare and advantage to be cognizant of the possible advantages these societies offer to the engineer?

The problems which face these engineering bodies are to the engineering world as the life problems of the individual engineer are to himself. In other words these bodies of engineers have shouldered the burdens and difficulties which face the profession. The more co-operation they receive from engineers the more successful will they be.

One of the greatest problems before the world of engineers, as any undergraduate will freely grant, is the problem of engineering education. The S. P. E. E. has been formed to help solve this troublesome problem.

Within its ranks are dean after dean and professor after professor of engineering and scientific schools besides interested practicing engineers. These men are not tackling their problem in a superficial manner but are going at the heart of the difficulties with earnestness and foresight under the control of able leaders. Cornellians will be quick to recognize the ability of some of the former presidents of the Society—C. L. Crandall, H. S. Jacoby and Anson Marston.

The present head of the Society, Professor C. F. Scott, Professor of Electrical Engineering at the Sheffield Scientific School at Yale, can best express the views of the Society in regard to the tasks at hand. President Scott says:

"Mr. Hoover, speaking at the Engineers Club in New York, said that the way public affairs are conducted is painfully distressing to one having an 'engineering type of mind'. The habit of ascertaining and agreeing upon facts before discussion and controversy and conclusions is rare. Much of political, industrial and social misunderstanding and agitation could be eliminated by the fact method, and yet, how little the engineering type of mind has to do with the Government. How many—if any—have had a commanding place in our political administration between the days of George Washington and Herbert Hoover?

"Engineering education has a wider function than training men to build bridges or produce power. 'Engineering is a mode of thinking.'

"Larger opportunities, wider fields and greater responsibilities await the engineer in the next generation.

"Today the future engineer is an engineering student.

"Underlying the whole engineering structure lies the training of the engineer; what preparation should he have, what knowledge, what training, what vision, what purpose? How can he be taught, developed and inspired?

"These are the problems of the engineering teacher—to their solution the Society for the Promotion of Engineering Education is dedicated—a progressive solution, as progress is forever a process of change."

Has not the Society faced their problem fairly and squarely, and have they not assumed a tremendous task? We cannot but contrast their attitude toward the student with that of some teachers more

or less like the one who went with a companion for his summer vacation to a lonely camp in the woods. After staying at their camp for a few days both began to heartily dislike the place and complain about it. "But," said the Professor, "Thank the Lord there isn't an undergraduate within twelve miles."

We are in favor of the S. P. E. E.

WHAT OTHER STUDENT CHAPTERS ARE DOING

In the numerous activities of our own Student Chapter, small attention has been paid to the work of the A. S. C. E. in other universities. It is true that, in the main, the plan of organization and management is essentially the same for all. However, there are many minor differences that might well be studied by members who are really interested in Chapter affairs.

To take a specific instance, we refer to the working plan of one of the largest Student Chapters, which, by the way, is considered a good model by A. S. C. E. authorities. There are many helpful suggestions in this outline of activities, though many details could not be successfully applied at Cornell.

The first and most radical difference in the outline is concerning membership. "Members should be chosen from those men who take an interest in Civil Engineering in school and who add to the general congeniality of the Chapter." This would seem to imply a more careful selection of members than is employed at Cornell. Our method of unlimited membership is more democratic and without doubt more suitable to our environment. However, it lies open to certain disadvantages. For one thing, many of our members do not attend meetings or take any part in the work of the Chapter. Perhaps if membership requirements were instituted to a greater or less degree, many students would be more greatly impressed with the importance of the Cornell Association. Another point is that most of our active members have no very clear idea of what their Chapter work is all about. The outline suggests that "new members should be required to read the Constitution and in other ways make themselves acquainted with the Chapter's activities and aims". This would undoubtedly stimulate the interest of our members.

The general plan of meetings is much the same as ours; first a short, formal business meeting, second, the address of the evening and, third, an informal get-together. Excess of formality is warned against.

Business is carried on by committees as at Cornell. It is suggested that some of the newer members serve on these committees in order to gain experience in carrying on the work of the Chapter in later years.

Street Traffic Relief===An Engineer's Job

Mr. Child describes the Traffic Problems which have Arisen in the Past Few Years and Shows How the Engineer can Aid in Improving General Conditions

(Courtesy of the Rochester Engineering Society)

By JOHN T. CHILD, C. E. '12

Engineer, Bureau of Municipal Research of Rochester

The regulation of street traffic and the relief of the congestion in our urban centers can in no way be considered as an isolated problem that can be solved by any empirical or other formula, no matter how complicated. Each city has local conditions tied up with many varied interests. In each we must take what we have and do the best we can with the money and authority available. In the past the engineer has had to do with many phases of civic growth and development, but there has been no correlation of ideas or no big practical conception of our street transportation needs.

Looking Backward

Where we plunge our transits and take back sights on street traffic problems, we soon find that they are of recent origin. There have been, in the past, times and places where local conditions required some sort of public ruling. One-way streets have been necessary in some cities for many years. Perhaps Moses acted as the first traffic officer. Did he not hold back the north and south traffic on the Red Sea while the Children of Israel marched across to a safety zone on the farther side?

A real continued need for traffic regulation was little felt until the automobile became a common means of transportation and brought with it the paved street and highway and a more speedy and general mode of transportation. Just about 20 years ago the first real traffic regulations were drawn up in New York City and these concerned the handling of carriages at entertainments. Prior to this time little thought had been given to street traffic and since then it has been chiefly the concern of the police. However, one well known engineer, William P. Eno, foresaw the need for its regulation and studied the problem as early as 1899. Since that time his patient and continued efforts have done much to solve current traffic problems in large cities both here and abroad. Although there has been at least one eminent engineer in the traffic field, the pioneering in traffic regulation has been sadly neglected and up to very recent years little constructive and advance thought was given to the subject either by technical men or others. The results obtained have been in the nature of legislative measures designed to relieve isolated conditions that had become intolerable. Even today conflicting interests prevent drastic measures of relief. So far no city of any size has solved its street traffic and parking problems. These municipal problems are continually changing and

their working out is dependent to a large extent on evolution and the economic conditions involved.

Room for Improvement

Many people interested in the regulation of traffic have been looking through the wrong end of the telescope. They jump to the conclusion that a little legislation will set things right if the police enforce the laws. But is a Council to blame for the city map or the natural topography? Did the police fix the width of streets or locate the crosswalks or car tracks? Thrice no. The early subdivisions of land were under no civic supervision and each was worked out independently. The results are shown by the city maps. Many of our traffic troubles are caused by narrow streets and walks, dead-end streets, short curves, street car track locations, grade crossings, poor choice of road surfaces, lack of open spaces and direct through routes. Are not these the result of neglected proper planning and foresight? Some will say that the engineer is to blame. He has been to some extent, but not so much through his engineering as through his poor salesmanship in getting his ideas across to the laymen that hold the money bags. Today, he recognizes the fact that selling his wares is by no means the least part of his job. A statement of the phases of the problems involved in traffic relief puts the matter largely up to the municipal engineer and he has need to bring his best powers to bear to meet the issue.

The Size of the Job

The extent of the job is startling as it bears on so many and diverse interests and economic considerations. The most important and far-reaching effects on traffic and also the slowest and most costly to develop are undoubtedly in the hands of the city planning engineers. They are concerned with the relations between the city and its suburbs; with major street plans, connecting links for public parks; with means of access between terminals and industrial and business centers; with real estate subdivisions and the use of zoning regulations. They are interested in improving existing plans and suggesting new ones. They must establish standards for local improvements. Their conceptions must be based on sound economic principles and sold to the public on the democratic doctrine of the greatest good for the greatest number. Their plans must be aesthetic and utilitarian, far-sighted and financially within reach. These things determine the manner of the evolution, which should be the guide to better conditions.

New local improvements point the way to the trend of population and growth. Their design and construction should have certain standards applied to pavement widths, corner radii, track locations, etc. The choice of street surfaces is important to the locality and its traffic. Pavement repairs must be kept up so as not to isolate districts or divert traffic because a continuity of well-paved streets is desirable. This requires work plans and careful expenditure of public funds for maintenance. The street railway frequently precedes the pavement, and the franchise requires no conformity of track layouts with street designs. Here the railway engineer should be required to cooperate with the municipal engineer.

The Role of the Police

The enforcement of traffic regulations and the protection of the safety of the general public of course is a non-technical phase of the traffic problem. The police are in the position of having to enforce rules and regulations under conditions which they are not responsible for except to a slight degree. Moreover, they are more or less dependent on public opinion for real power to enforce the laws. Recent developments in large cities have called upon the ingenuity of electrical engineers to devise satisfactory signal lights and towers for the guidance of traffic by police officers. The police phase of the problem is one of organization, adequate police power, size of force and the keeping of accurate accident records. There is considerable need for uniformity of regulations and standardization of signals and road signs. The engineer can help by designing and installing good lighting systems and street improvements with a view to safety and facility of movement.

Snow Removal

Within very recent years the automobile has come into greatly extended use in the winter months. This is particularly true of the private automobile since the recent and growing popularity of the closed car for all year use. The increasing interest in closed cars is shown particularly by the closed car auto shows which are held now annually in addition to the regular automobile shows. Whether the coming winters are open or not there is bound to be a large increase in the use of automobiles in the winter time.

Thus, the problem of quick and cheap snow removal is important to winter traffic movement in northern American cities. The New York City Department of Street Cleaning keeps a small staff of engineers working on snow removal plans. They design, test and recommend types of equipment to be used. Snow fighting plans and maps are prepared showing which areas are to be cleaned and how. The use of sewers for snow dumping is studied and manholes located accurately so they can be found on short notice. When a storm is raging, periodic

work reports are received and progress maps prepared for the use of the directors of the thousands of men employed during storms. In this work the maps and statistics prepared by engineers are vital to successful management.

Street Car vs. Automobile

The street transportation facilities and demands of a city affect to a marked degree the congestion of traffic. Automobile drivers in superior numbers complain that street cars occupy too much of the roadway and are too slow; that they stop too often and that the car stop safety zones reduce the parking space and form bottle necks which throttle traffic. The street car, though outnumbered, still carries by far the greater number of people and the officials complain that the automobile driver slows up the possible headway by driving on the track area. So the conflict goes on. Motor bus enthusiasts say that the street car must give way to the more flexible bus for short passenger hauls. The finances of our electric railways are now under great strain, but in most cities the railways build, pay for and maintain an 18 foot width of pavement in the track area, an item of perhaps \$30,000 per mile initial expense. That is the chief reason why motor busses can now compete with them. Undoubtedly both are here to stay, but each has its place. Car and bus should not be allowed to compete on the same streets but their services should be coordinated to the best interests of both for service to the public. Has the municipal and railway engineer any interests in these struggles for supremacy?

Parking

Now the parking problem is becoming more and more acute in all cities. The traffic regulations tend more and more to reduce parking, both in time and space, but the automobile registration is still increasing perceptibly; the motor truck and bus industry is just getting under way and the horse is still with us. The driver wants to leave his car near the building where his business or pleasure is—perhaps he will walk a block if necessary without growling. The delivery man must get near his loading or unloading point, but other drivers have less reason to complain. However, the fact remains that we all want to leave our cars when and where and for as long as we please, but on account of that well known law that two objects can't occupy the same space at the same time, and because motor cars make us lazy, it is up to the engineer to find parking spaces and means where no such things exist.

Traffic Bureaus Needed

The American Society for Municipal Improvements has recommended that our larger cities establish Traffic Bureaus or divisions. The idea of this is to make immediate street traffic problems some one

(Continued on page V)

Changes in the Curriculum

By PROFESSOR FRED ASA BARNES '97
Director of the School of Civil Engineering

Every year, after making changes in the curriculum, the faculty has a feeling, or, at least a hope, that it can sit back and watch the new program work for a few years; but experience proves that this hope is doomed to disappointment. Last year, this feeling was so strong that, when we took up the revision of the Announcement this year, we considered only the change made necessary by the shifting of Public Speaking to the junior year; and the three hours of the senior year thus freed were filled by making Cost Keeping and Management a required course and increasing its credit to three hours. But suddenly the Sibley School of Mechanical Engineering came forward with a proposal for sweeping changes in the freshman year, the adoption of which made necessary changes in practically the entire curriculum.

The Freshman Course

As far as the freshman year is concerned, the circle of experimentation forced on us by the consolidation of the engineering colleges is complete as is evidenced by the following table of hours:

	Before 1919	During 1920	After 1921-22	Net Change 1923	
Mathematics	10	8	8	11	+1
Physics	8	8	8	6	-2
Chemistry	6	6	8	6	0
Drawing or Descriptive Geometry	6	6	4	6	0
Elementary Surveying	3	3	3	3	0
Shopwork	0	3	3	3	+3
Introductory Lectures	1	2	1	1	0
	34	36	35	36	+2

For the three years of experiment, 1920-1922, mathematics was continued in the sophomore year by giving three hours of integral calculus along with first term mechanics, an arrangement which has not given satisfaction.

Though physics is reduced two hours the work will be given in a special combined course instead of in two separate courses as has been the case. Furthermore, only those offering advanced mathematics for entrance will be admitted to this course. That is, it is primarily for engineers and it is believed that the six hours given in this way to students having the same preparation and in a smaller group will be as effective as the eight hours formerly given to the much larger mixed group in two separate courses.

In chemistry the first experiment was to give three hours of the course each term, i. e., lectures and recitation one term and laboratory the other. Some improvement was made by increasing it to four hours each term but we now return to the old arrangement of six hours all in one term.

Cause for Change

The demand for the change this year arose prin-

cipally because of the feeling in the Sibley School that the drawing course of two hours each term did not give adequate preparation for the advanced work, yet it contained all that was deemed desirable in a common course for all engineers. This problem has been solved by making the course three hours each term and giving each school control over the second term's work for its own students.

This necessitates having the students select their school at the middle of the freshman year, but inasmuch as they did this at the beginning of the freshman year last fall and the Directors have been following the scholarship records of their respective students during the first term, this presents no practical difficulties. Of course one can easily change from one school to another even after the sophomore year as has always been the case.

The net result then is that C. E. students get one hour more of mathematics than they did just before the consolidation (though we at one time required eleven hours) and three hours of shop work while they have two hours less of physics.

Advantages

The work of the two terms is much better balanced and it is believed that the new arrangement will be a great improvement over any of the schemes that have been tried since the consolidation of the colleges.

Removing three hours of integral calculus from the sophomore year made it possible to put Public Speaking in that year and the work in Mechanics will be strengthened by the addition of a one hour course in laboratory work each term.

This was made possible by moving the engineering laboratory to the junior year. This laboratory was also increased to a three hour course and will include the laboratory part of concrete construction, which will also be given in the junior year at the same time as the laboratory. This shift of concrete construction was made possible by the shift of technical reports to the sophomore year.

These changes can not be put into full effect until year after next, but will be introduced as rapidly as possible. Juniors will take the old course in concrete construction next year and seniors the new course in cost keeping and management. The extra time allowed for this course will be used to strengthen the cost keeping work and to introduce some work in construction accounting.

It is believed that all the above changes will strengthen the course and those interested in the details are invited to ask for the new Announcement of the College of Engineering which will be published soon.

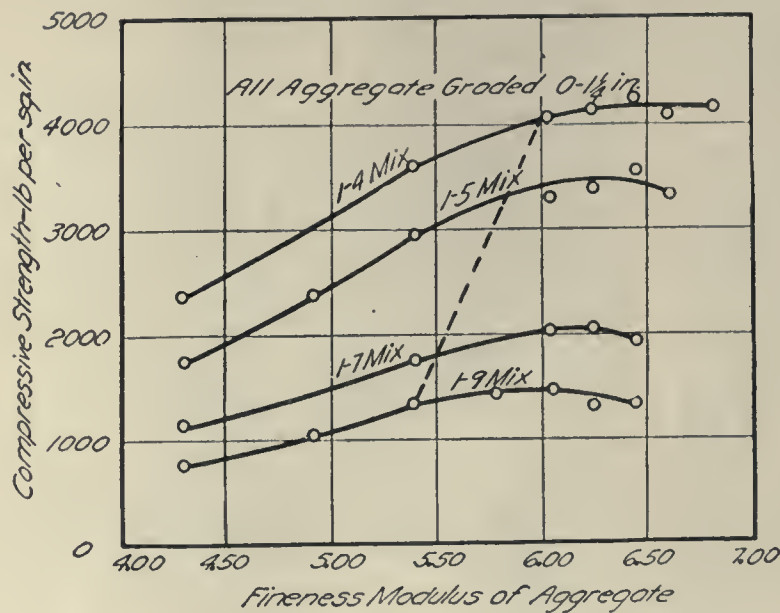
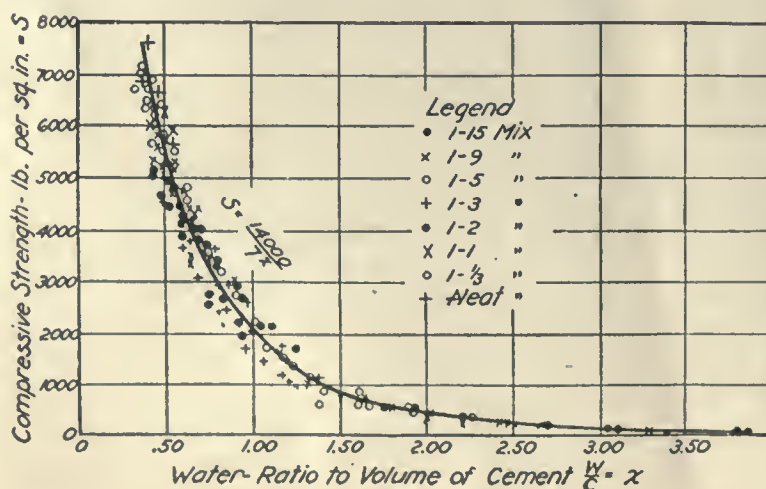
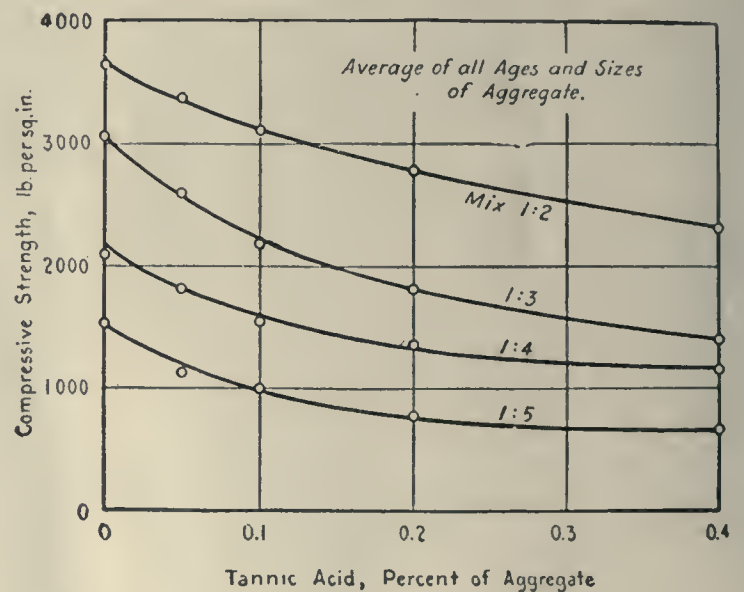


Fig. 2. Effect of Tannic Acid (Vegetable Matter) Upon the Compressive Strength of Concrete.

Note that one-tenth of one per cent of vegetable matter reduces the strength of concrete as much as 30%



Recent Developments in Concrete

BY H. C. BOYDEN
Portland Cement Association.

New methods will mean Saving of Material, Use of Aggregate heretofore Rejected, and Better Ways of Proportioning and Mixing

It is possible that some of the points to be brought out in this paper are more or less familiar to some of those present, through the reading of publications on the subject and the discussion of them in the technical press. There are many, however, to whom the facts will be new and of interest and the others may have questions they would like to have answered. If these questions are not answered in this paper, the Portland Cement Association will be glad to send further information.

The art of making concrete is an old one, but it is only in recent years that serious large scale investigations of its structure and the real effect of various combinations of the ingredients, have been undertaken.

In 1914 the Structural Materials Research Laboratory was established at Lewis Institute, Chicago, with Professor Duff A. Abrams at its head. The establishment of this laboratory was made possible through the cooperation of the Portland Cement Association and the Lewis Institute. This laboratory is a striking example of cooperation between an engineering college and a manufacturing industry of international scope.

There are only two ideas governing the policy of this laboratory: the first is, that the real facts regarding concrete and its ingredients shall be found out, with a liberal policy regarding the time required and the expense involved; the second is, that whatever the conclusions may be, they shall be given to the engineering profession for the improvement of the art of making concrete.

These investigations are still being carried on, but many points of vital importance have already been established. As an example, these data warrant the use of considerably higher unit stresses than those in common use today, with a consequent possible reduction in section. Conclusions have also been reached that will enable excellent results to be obtained with aggregates heretofore condemned, and also to increase greatly the ability of concrete to resist wear.

These conclusions and many others, are all based on tests running into the thousands and covering long periods of time. Incidentally, the laboratory is equipped for and is making close to 75,000 tests a year, so that there is no lack of facilities for carrying out investigations in the most thorough manner.

General

The study of concrete may be conveniently divided into three phases:

1. The study of the characteristics of the ingredients.
2. The study of the effect of making various combinations of these ingredients.
3. The study of the effect of the various manipulations of the ingredients in making and curing concrete.

This paper will touch on only those investigations that have brought out essential changes in previous ideas of the subject or that have confirmed those ideas beyond a doubt.

It has been the custom to speak of concrete as having three ingredients: cement, fine aggregate and coarse aggregate. The laboratory studies have shown the desirability of classifying the ingredients as cement, aggregate and water, or if it is still desired to maintain the purely arbitrary division of the aggregate into fine and coarse, to add the fourth ingredient, water.

Although cement is one of the most important ingredients of concrete, it requires probably the least discussion, as all the standard brands of Portland Cement on the market today conform to generally accepted specifications and laboratory investigations have brought out no essential need for changes in these specifications.

As stated above the aggregate has always been divided into two parts, sand, and crushed stone or pebbles. The line of division, purely an arbitrary one, is the quarter-inch screen, the portion passing through this screen being classified as fine aggregate or sand, and the portion retained on this screen being called the coarse aggregate. There is no particular advantage gained by this division, but it would be much better to consider the aggregate as a whole, with a proper graduation of the various sizes from the largest to the smallest. It is not intended by this, however, to recommend the use of bank run or crusher run aggregate, as under no conditions should they be used without separating the sizes and recombining in the proper proportions.

However, until such time as this method of considering the aggregate shall have become of general practice we will consider it as being divided into two parts by the $\frac{1}{4}$ in. or No. 4 screen, and will so discuss it.

Fine Aggregate

It is customary to specify that the fine aggregates shall be clean, sharp and not too fine. It would be better to omit the word "sharp", because rounded

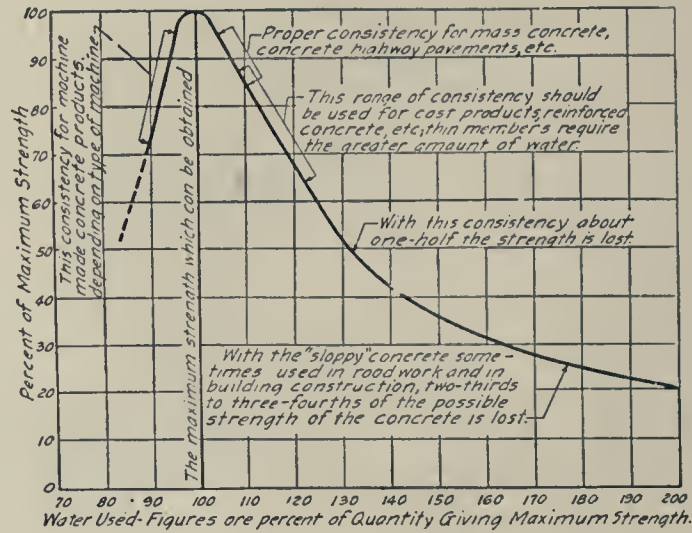


Fig. 4. Effect of Quantity of Mixing Water on the Compressive Strength of Concrete.

Note: In general construction, the maximum strength can rarely be obtained, but it is possible to obtain 70% to 90% of the maximum strength without additional expense by watching the water content carefully.

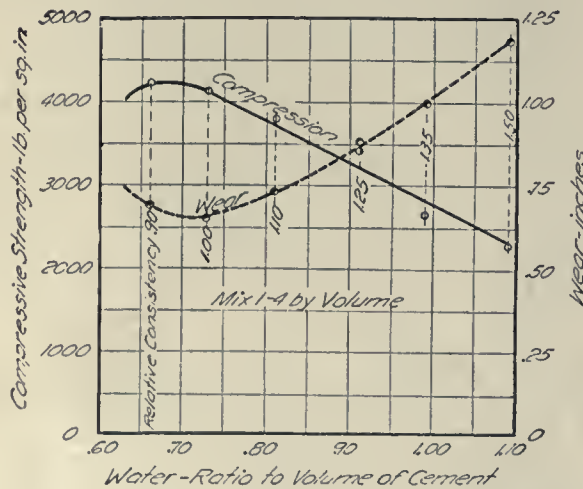


Fig. 5. Relation Between Quantity of Mixing Water, and the Compressive Strength and Resistance to Wear of Concrete.

Note that the curves are practically the opposite of each other. In other words, that proper restrictions on quantity of mixing water increase the compressive strength and increase the resistance to wear (decrease the wear).

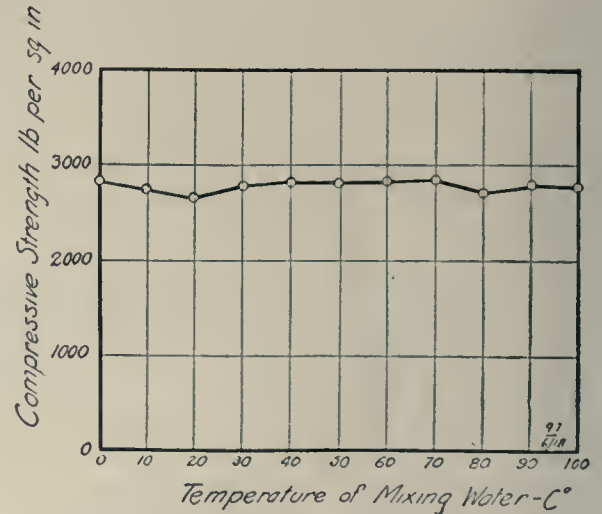


Fig. 6. Effect of Temperature of Mixing Water on Compressive Strength of Concrete.

Note that no appreciable effect is produced by changes in temperature of mixing water between 32° and 212° F.

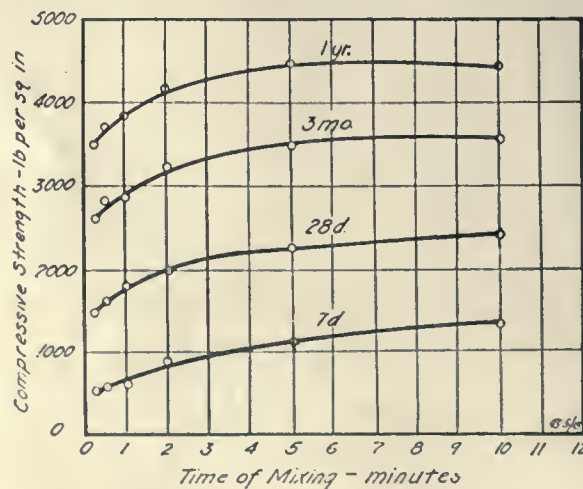


Fig. 7. Effect of Time of Mixing on Compressive Strength of Concrete.

Note rapid increase during first minute, slightly less increase during second minute, and slight increase during remainder of time of tests.

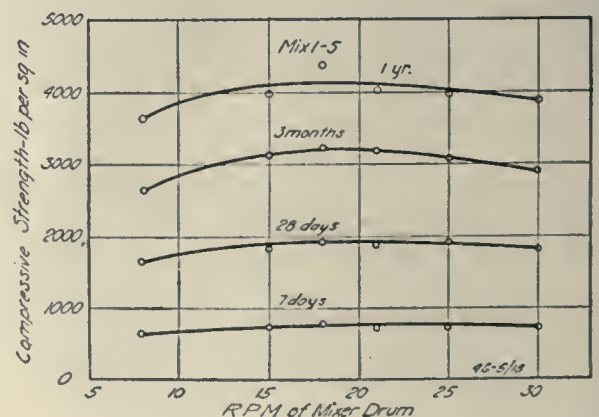


Fig. 8. Effect of Revolutions Per Minute of the Mixer Drum Upon Compressive Strength of Concrete.

Note that between 12 and 25 R. P. M., the speed of the mixer drum has practically no effect on the strength of the concrete. Concrete mixed one minute at 12 R. P. M. gave the same strength as that mixed one minute at 25 R. P. M.

particles find their way into place more readily than do sharp ones, and require less water to produce a workable mixture. It is this lowering of the relative quantity of water used that causes the greater compressive strength found in concrete made with smooth, rounded sand. It would be well to insert the word "hard" because that quality is very desirable.

The laboratory studies have brought out two important facts regarding sands. One of these is the great importance of being sure that the material is clean, not only in appearance but in fact. Very often sand which appears to the eye to be clean, contains enough humus or vegetable matter to reduce the strength very considerably.

As an illustration, a clean sand gave a compressive strength at 28 days of 1,900 pounds. This same sand with one-tenth of one per cent of tannic acid added, gave a strength of only 1,400 pounds; in other words, one-thousandth part of organic impurities in terms of the weight of the sand reduced the strength of the concrete over 25 per cent. In the investigation of the effect of organic impurities many natural sands were used, but as it was not feasible to secure sands containing a wide variation of organic impurities, tannic acid was used as a substitute for the purpose of making further tests. It was felt that the effect produced by such a material would probably be a measure of the effect produced by other organic impurities which might be present in natural sand.

How can these organic impurities be detected if they cannot be seen by ordinary inspection? By using the colorimetric test for organic impurities which was devised at the laboratory. This test consists of digesting a representative sample of the sand in a dilute solution of sodium hydroxide (caustic soda = NaOH) and observing the resulting color of the liquid.

All that is needed is a 12-oz. prescription bottle and a little 3 per cent. solution of caustic soda or sodium hydroxide, both obtainable at any drug store. Put in about $4\frac{1}{2}$ ounces of the sand to be tested, fill up to the 7-ounce mark, after shaking, with the solution of caustic soda, let it stand for 24 hours and observe the liquid on top. If this liquid is clear or light straw-colored use the sand; if it runs into the brown color and especially dark brown, reject the sand or wash it thoroughly before using.

The second fact brought out by the laboratory studies is that fine sand behaves exactly the same as coarse sand except in one particular. In order to produce a plastic, workable mixture with fine sand it is necessary to use more water than with a coarse sand. It is the excess of water that reduces the strength of the concrete. In other words if concrete could be mixed with the same quantity of water regardless of the grading of the sand, and a plastic mix obtained in both cases, the same strength would be secured in the concrete.

Coarse Aggregate

When studying the characteristics of coarse aggregate one conclusion has been brought out very sharply; namely, that the hardness of the aggregate is a secondary consideration as compared with other factors, in developing high crushing strength in concrete, and of less importance than ordinarily supposed in developing ability to withstand abrasion. This was very clearly shown in comparative tests made by burnt shale for use in building concrete ships. Samples made with this aggregate compared very favorably with those made with a much harder aggregate. A stone must be very friable indeed if it is not strong enough, when properly combined in concrete, to more than maintain the load likely to be carried by the concrete.

The reason for the high compressive strength often secured where a light, soft aggregate is used, is because the porosity of the aggregate reduces the quantity of water available in the mixture. Here again the relative quantity of the mixing water is the governing factor.

For road surfaces, however, another quality is needed in concrete, namely, resistance to wear or abrasion, and to obtain this the stone must not be too soft. It is not advisable to use a stone with a French coefficient of less than 7 although pavements have given excellent results when made with stone having a coefficient as low as 6.

It is not intended in calling attention to the above results to advise throwing down the bars and allowing the use of any and all stones, irrespective of their hardness or wearing qualities. It is desired, however, to show that many of the safeguards that have been put into specifications in past years are not safeguards at all, and that the effect of following them may be entirely lost through neglect to observe other factors of more vital importance. It is always advisable to use the best materials obtainable; but there have been many cases when the local and easily obtainable material has been rejected, when it could have been used with excellent results, by following proper principles in proportioning and protecting the concrete; oftentimes better results would have been obtained than resulted from the use of imported materials and then neglecting the really important factors in making good concrete.

Water

The remaining ingredient of concrete, water, is in reality of equal importance with the cement in obtaining good concrete, and yet it is often the most carelessly used and most loosely specified of all the ingredients, generally neglected in specifications and frequently not even reported in the published data of concrete tests.

The laboratory has conducted tests of waters sent in from all parts of the country, but definite conclusions have not as yet been published. It is safe to

(Continued on page VI)

ALUMNI NOTES

'92. Colonel William G. Atwood and Hermann von Schrenk '93, spent a few days in Ithaca recently consulting with Professor Wilder D. Bancroft and others interested in an investigation now being made in the matter of marine piling. Atwood is director of the piling investigation committee of the National Research Council which is cooperating with the Chemical Warfare Service in this matter. Von Schrenk is an expert on timber preservation.

'94. C. Morton Ayres is engaged in the practice of engineering and architecture with offices at 410 Twenty-second Avenue, Tuscaloosa, Ala.

'95. Albert L. Colston is principal of the Brooklyn Technical High School, Flatbush Avenue and Concord Street, Brooklyn. His home is at 1556 73rd Street, Brooklyn, N. Y.

'95. Russell Hopkinson and Miss Mary Barbey Lewis, daughter of Mr. and Mrs. Roger Lewis '95, were married on December 2 in St. Thomas' Church, New York.

'97. Alger A. Conger is consulting engineer for the New England Power Company, 35 Harvard St., Worcester, Mass. His home address is 13 St. Elmo Road, that city.

'00. L. D. Conkling is Professor of Civil Engineering at Montana State College, Bozeman, Montana. He may be addressed at 516 South Grand Avenue, Bozeman, Mont.

'01. LeVan M. Burt is assistant engineer with the Bureau of Highways. His office is at 50 Court St., Brooklyn, N. Y.

'02. Louis A. Mitchell is engineer of maintenance of way with the Union Traction Company of Anderson, Ind.

'05. Don. E. Andrews is rubber technologist for the U. S. Rubber Plantations, Inc. of Singapore, S. S. He and Mrs. Anderson, who was formerly Ella B. Wescott, '99, live in Fairhope, Ala.

'05. Frank C. Tolles is with the engineering firm of Swigart and Ehrman, Akron, Ohio.

'09. Hart Cummin is with the El Paso, Texas, Chamber of Commerce as Municipal Research Engineer. Letters addressed to the care of the El Paso Chamber of Commerce will reach him.

'09. James M. Felknor has been selected to supervise the construction of about fifty miles of highways in Colusa County, California, the funds for which were raised by bond issue.

'09. Isadore Walzer has resigned as County Assistant Engineer, Nassau County, of the New York State Highway Commission and has become the Secretary and Treasurer of the Heling Construction

Corporation, Engineers & Road Contractors. Their headquarters are at Lindenhurst, L. I., N. Y.

'10. Frank H. Maey, Assistant Engineer, Bureau of Water Power, Office of the New York State Engineer and Surveyor, has an article on "Reservoir Spillway Discharge Studies" in the Engineering News-Record for February 22, 1923.

'11. A. J. Dillenbeck is now associated with Mr. Lupfer in the Edward P. Lupfer Corporation, successor to Lupfer and Remick, Consulting and Contracting Engineers for whom Dillenbeck has been assistant engineer for several years. Mr. Remick withdrew from the firm on February first. The offices of the new concern are in Ellicott Square, Buffalo, N. Y.

'11. Miss Sarah B. Frisch, daughter of Mrs. Hannah Frisch of New York, and Samuel L. Gastliek, '11, were married on January 7 and are now living at 308 Huguenot Ave., New Rochelle, N. Y.

'12. M. A. Darville is with the Turner Construction Company at 244 Madison Ave., N. Y. C. His home address is 162 25th St., Jackson Heights, Elmhurst, N. Y. Darville reports that the following Cornell Graduates are with the same company at the place stated: W. C. Anderson, '14, A. B. Pope, '14, and C. B. Lovden at New Orleans; A. O. Degling, '20, at Pittsburgh; D. G. Douglass, '19, at Orlando, Fla.; C. E. Rauh, Jr., '22, C. J. W. Smith, '22, and C. W. Wood, '21, at Buffalo; and R. W. Thompson, '22, at New York.

ex-'13. William R. Munson was married on September 7, last, to Miss Virginia Noel. At present, he is engineering superintendent with the E. V. Johnson Company, Contractors. Mr. and Mrs. Munson may be addressed at 2460 East 72nd St., Chicago, Ill.

'13, '17. Albert A. Ward, '13, and Ernst W. Kurz, '17, are engaged in the contracting business in Ithaca under the name of Ward-Kurz Co.

'13. Russell D. Welsh is resident engineer for William C. Olsen of Karsten, N. C., and is stationed at Elizabeth City, N. C.

'14. Paul L. Heslop is now with the Charles B. Hawley and Company at Clarion, Pa.

'14. Thomas T. Newbold has been transferred from Baltimore to the Philadelphia office of the Raymond Concrete Pile Company, 1423 Locust St., Philadelphia, Pa.

'14. William M. Reek has resigned his position as district engineer with the Concrete Steel Company of Syracuse and is now employed as district manager for the Kalman Steel Company of the same city. Mr. Reek is in charge of all sales and engineer-

ing for the territory embracing central New York from Albany west to, but not including, Buffalo.

'14. Adrian K. Webster is still engaged in the farming and cattle-raising business in Vega, Texas. He writes that a big zinc smelter is locating there to use some of the gas produced by the world's largest natural gas field, recently located about fifty miles north of Amarillo. Oil has also been discovered in Carson County and a big boom is expected in the spring.

'15. Edwin S. Baker is secretary of the A. B. Smythe Co., real estate investments, with offices in the Erie Building, East 9th and Prospect Streets, Cleveland, Ohio.

'15. After April 10, James R. Rosenfeld will be located at 1433 Inverness St., Pittsburgh, Pa., instead of 5857 Northumberland Road. Mr. and Mrs. Rosenfeld are the parents of a second son, George R., who was born on November 25, 1922.

'19, '21. William A. Andrews and Miss Effie London were married on September 9 at Fairfield, Iowa, and are now living at 4534 Wornall Road, Kansas City, Mo. Andrews is a heating and plumbing contractor with offices at 120 South West Boulevard, Kansas City.

'21. Earl A. Andrews is with the American Radiator Company at Buffalo, N. Y. His home address is 22 Park Ave., Danbury, Conn.

'21. Arthur Fertel is with the Raymond Concrete Pile Company at Norfolk, Va. His address is 420 34th Street.

'21. Trygve W. Hoff was married on December 16 to Miss Gertrude Elford, daughter of A. S. Elford of Seattle, Wash. They are making their home at 337 Park St., Upper Montclair, N. J. Hoff is working in the office of his father, a consulting engineer, and has been checking the designs for a bridge across the Hudson for the N. Y. C. Railroad, one across the Niagara for the Michigan Central Railroad, and one across the Ohio for the Big Four. Mrs. Hoff was an Alpha Phi at the University of Washington. She came to Wells College in her Junior year.

'22. Tsu Yi Chen is designing engineer for the American Bridge Company, 30 Church St., N. Y. C. His home address is 22 Neu Yang Shih Hsiang, Hangchow, Chekiang, China.

'22. Harry Garfunkel has left the Elmira Plant of the American Bridge Company and is now in the employ of the Berlin Construction Company of Berlin, Conn. His address is 3 Trinity St., New Britain, Conn.

'22. Carleton E. Bryant is a designing engineer with the Johns-Mansville Company in New York City. At present he is working on the design of small structures such as garages, pump houses, portable shacks, etc. His home address is 426 South Columbus Avenue, Mount Vernon, N. Y.

THE HAROLD INGERSOLL BELL RESEARCH FUND

The Board of Trustees of Cornell University at a meeting held on January 20th, 1923, formally accepted a gift of five thousand dollars from Mrs. Harold Ingersoll Bell to be used in the creation of a fund to be known as The Harold Ingersoll Bell Research Fund. Mrs. Bell's gift is a memorial to her late husband, Harold Ingersoll Bell, C. E. 1905, who died in New York on December 28th, 1921. In



HAROLD INGERSOLL BELL '05

her letter offering the gift Mrs. Bell states, "It is my desire that the income from the fund shall be used to purchase equipment and supplies for research in hydraulic engineering and related fields. I hope that this fund will prove of real service to the University in the field of work in which my husband was so deeply interested." In establishing the fund the Board of Trustees have specified that

the income from the fund shall be used according to Mrs. Bell's desire. The Gift is a very timely one and much appreciated by the faculty of engineering, and particularly by those interested in research work in this particular field where lack of funds has long delayed important investigations. This lack has often seriously affected the progress of students who have been working on advanced problems and whose finances were so limited as to prevent them from purchasing even minor pieces of equipment needed in their work. The income of this fund will supplement in a proper manner any funds that may be available from the Heeksher Research Foundation for work in this field. The use of the income from the Heeksher Foundation must, necessarily, be restricted in the matter of purchasing apparatus, to very special instruments and machines. The Bell Fund will provide for materials and apparatus that normally must be purchased from departmental appropriations which usually are so small as to greatly handicap research so far as such expenditures are concerned. The gift, therefore, will be, as Mrs. Bell hopes, a source of real service to the University and it is a most fitting memorial to her husband's memory.

(Continued on page VII)

BOOK REVIEWS

THE YOUNG MAN AND CIVIL ENGINEERING

The Young Man and Civil Engineering, by George Fillmore Swain, Gordon McKay, Professor of Civil Engineering at Harvard University, Past President of the American Society of Civil Engineers, etc. New York: The Macmillan Co. Cloth; 12mo.; pp. 199, xi and Index. 1922.

This little book is one of the "Vocational Series" which will consist of twelve volumes on "The Young Man" and each of the following professions: Law, Ministry, Teaching, Medicine, Journalism, Banking, Business, Mechanical Engineering, Electrical Engineering, Civil Engineering, Farming and Government Service. These books are "designed to offer competent advice to young men upon the verge of choosing a profession" and if the other authorities succeed in their tasks as well as has Professor Swain in the volume under discussion, not only will this purpose be accomplished, but practicing engineers will have something to give them a new outlook on their profession, and professional men in general will have a source of authoritative information concerning their own profession and all the others mentioned.

The editor of the series, Dr. E. Hershey Sneath of Yale University, so admirably answers the question, "Why a vocation," in his prospectus, that part of it is well worth quoting:

"One of the most important decisions a young man is called upon to make relates to the determination of his life work. It is fraught with serious consequences for him. It involves the possibility of success or failure. The social order is such that he can best realize his ends by the pursuit of a vocation. It unifies his purposes and endeavors, making them count for most in the struggle for existence and material welfare. It furnishes steady employment at a definite task as against changeable effort and an unstable task. This makes for superior skill and greater efficiency which result in larger gain to himself and in a more genuine contribution to the economic world.

"But a man's vocation relates to a much wider sphere than the economic. It is intimately associated with the totality of his interests. It is in a very real sense the center of most of his relations in life. His intellectual interests are seriously dependent upon his vocational career. Not only does the attainment of skill and efficiency call for the acquisition of knowledge and the development of judgment, but the leisure that is so essential to the pursuit of those intellectual ends which are a necessary part of his general culture is, in turn, dependent, to a consid-

erable extent, upon the skill and efficiency that he acquires in his vocation.

"Nor are his social interests less dependent upon his life-work. Men pursuing the same calling are in a peculiar sense a great fraternity or brotherhood bound together by common interests and aims. These condition much of his social development. His wider social relationships also are dependent, in a large measure, on the success that he attains in his chosen field of labor.

"Even his moral and spiritual interests are vitally centered in his vocation. The development of will, the steadying of purpose, the unfolding of ideals, the cultivation of vocational virtues, such as industry, fidelity, order, honesty, prudence, thrift, patience, persistence, courage, self-reliance, etc., all of this makes tremendously for his moral and spiritual development. The vocationless man, no matter to what class he belongs, suffers a great moral and spiritual disadvantage. His life lacks idealization and is therefore wanting in unity and high moralization. His changeable task, with its changeable efforts, does not afford so good an opportunity for the development of the economic and social virtues as that afforded a man who pursues a definite life-work. It lacks also that discipline—not only mental but moral—which the attainment of vocational skill and efficiency involves."

The next question arising for the individual is, of course, "What vocation?" as one may fail as miserably from choosing the wrong profession as from choosing none at all. These books are designed to assist one in making that choice and there is abundant evidence that Professor Swain realized the great responsibility of his task of making known the requirements and qualifications necessary for success in civil engineering as well as the difficulties attending its practice. That is, the picture is not one to attract the shiftless and easy-going, but rather one to inspire those who are willing to work hard for the satisfaction, which is the only durable one, of being of service to mankind at a reasonable compensation.

In his Introduction, the author gives a brief descriptive history of engineering bringing in various definitions and finally suggesting a new definition as follows:

"Engineering is the science and art of applying, economically, the laws, forces, and materials of nature, for the use, convenience, or enjoyment of man."

This seems to me complete and to bring out admirably not only the ideal of service to mankind which underlies the great constructive profession of engineering but also the idea of the greatest service

through the economic use of the means employed.

Further evidences of the author's high opinion of the profession are found in such phrases as: "It may, however, be fairly claimed that the development of engineering was not a **result** of the advance of civilization, but the principal **cause** of it." "—that the moral teachings of the religions of the world to-day had their origins centuries ago; that human nature to-day, notwithstanding all these moral teachings, remains essentially the same as it has always been,—it will probably be perceived that what we call progress in civilization has been mainly due to the advances in the applications of the laws of nature, that is, to the work of the engineer, and that any improvement in moral standards and ideals follows as a result of these advances," and many others.

Chapter II contains detailed descriptions with sufficient concrete examples to sustain interest, of the following branches of civil engineering:

- (1) Surveying and Geodesy
- (2) Railroad Engineering
- (3) Highway Engineering
- (4) Hydraulic Engineering
- (5) Sanitary Engineering
- (6) Structural Engineering
- (7) Municipal Engineering

This chapter is easily the most important of the whole book for the "young man upon the verge of choosing a profession", though the average high school senior will not understand all of it, as, for instance, p. 61, "Sometimes, by taking advantage of a bend in a river, the building of a short canal will permit the development of a very large power".

The qualifications necessary or desirable for the civil engineer, given in Chapter III, are divided into professional qualifications and personal qualifications. The former are:

"(1) A knowledge of the forces of nature and of the laws governing them; in other words, a knowledge of natural science, logic and mathematics.

"(2) A knowledge of the materials applicable in construction.

"(3) A training in those branches of knowledge which have to do with the economical adaptation of means to ends.

"(4) A perception of the true relations of things, or a sense of proportion, which will indicate what measures or projects that are physically possible will really conduce to the **use** and **convenience** of man."

The personal qualifications are: judgement, balance, a trained mind, experience, initiative, good health and knowledge.

All of the professional qualifications and at least two of the personal ones depend upon the "Education of the Engineer" which is treated in Chapter IV; but while the young man in high school may get

some benefit from the discussion of the work of colleges as compared with that in technical schools, this chapter is likely to prove more valuable to more mature men, engineering educators and others.

Further "Characteristics of Civil Engineering as a Profession" (and of civil engineers) are given in Chapter V, and Chapter VI discusses briefly "The Outlook for The Civil Engineer". This paragraph of the latter is worth quoting:

"Our universities should not ignore the handwriting on the wall, and should realize the necessity of filling the needs of the future in applied science. They must overcome the prejudice in favor of a so-called 'culture' which is merely a superficial veneer, without thoroughness or discipline, while doing all they can to promote real culture, combined with discipline, and to bring out the best and highest that is in each student. On the other hand, students of engineering must broaden themselves beyond the narrow limits of their professional studies, and qualify themselves to deal with the great problems of the day, to use the mother tongue correctly, to gain acquaintance with other languages and literatures, and with the thoughts and deeds of great men."

Concluding Suggestions, Chapter VII, contains some excellent advice for students of all ages and the Code of Ethics of the American Society of Civil Engineers; and a short index (in which Rensselaer Polytechnic Institute mentioned on page 114 as the first engineering school in America is not to be found), completes the volume. In connection with the above statement concerning Rensselaer, Professor A. E. Winslow, in volume 81 for the Engineering News-Record, p. 955, claims that Norwich University is the oldest civil engineering school as it was giving a full C. E. course as early as 1825. Alfred W. Craven, first president of the American Society of Civil Engineers, graduated from Norwich with the degree C. E. in 1825.

Cornell men will find much in support of the kind of training given them in civil engineering in this book and the six year course mentioned as having been adopted at Columbia University has been offered at Cornell for some twenty years. Few have taken it, however, and of those few only two or three are outstanding as especially successful, which also checks up with Professor Swain's opinion in regard to those who have taken both the college course and a technical one. And, after all is said and done, probably the most important qualifications for success are those inherent in the individual and the function of the university is merely to encourage their development. And in this such books as the one before us will help. A copy of each of the "Vocational Series" should be in every high school library and also in every college library, and a richer understanding of the problems and ideals of others would result if every professional man would read carefully and thoroughly the entire series.



SCHOOL NOTES

FUERTES MEMORIAL CONTESTS IN PUBLIC SPEAKING

In each issue of the Cornell Civil Engineer of this year, there has been given an explanatory article concerning the value and merit to be gained by competing in one of the several prize contests in which C. E. men are eligible. It is only a short time now until the aspirants to fame and fortune from C. E., M. E., and Arch. will be permitted to show their ability, in presenting the various subjects which they have chosen, before the Fuertes Memorial Commission.

Within the past few weeks, each upperclassman, in C. E., has received a communication from the Faculty, advising of the approaching contest and asking cooperation in turning out a good representation for the contest.

M. E. and Arch. lead us to date, consequently we want a decisive victory this year to place us 'way up on top. Below is published a list of the prizes. Get going, sons of Lincoln Hall! SUCCESS!

PRIZES AWARDED BY THE FUERTES MEMORIAL COMMISSION

First Prize	\$125
Second Prize.....	35
Third Prize	20

These prizes were donated by Charles H. Baker, C. E., '86, and for that reason, it is especially desirable that men from the C. E. School be among the winners.

THE BANQUET

The twenty-second annual banquet of the Association of Civil Engineers was held, according to custom, in the main dining room of Prudence Risley Hall on the evening of Friday, March the sixteenth.

Due to the engineer's ingrained habit of punctuality, the corridors of Risley were thronged at the scheduled hour of seven, and in the time that elapsed while the committee went ahead to get acquainted with the waitresses, two hundred of Cornell's Finest were allowed to cool their heels outside the doors of the banquet hall. After some four thousand minutes of valuable time had departed in this fashion, the big doors swung open and little time was wasted in advancing to the scene of the festivities.

The hall presented its usual attractive appearance, and the snowy table linen made a delicious background for the red bandanna handkerchiefs which topped the piles of souvenirs at the various places.

Favors First

The program opened with the singing of the Alma Mater, accompanied by A. H. Chapman, '24, at the piano. A brief examination of the much-prized favors then took place, which revealed three booklets concerning the use of dynamite and blasting powder contributed by the Hercules Powder Co., two booklets about Steelerete Products from The Consolidated Expanded Metal Companies, and a pamphlet on Warrenite Bitulithic Pavement. In addition to the literature, the favors included an extremely useful box of pencils given by the Joseph Dixon Crucible Co., a handy scale from the Lehigh Portland Cement Co., a pencil clip from the Gurley Instrument Company, and a slide rule sort of jigger from the Philip Carey Co., which gives the quantities of Elastite expansion material necessary per mile for various widths of pavement, and also the amounts of material for the different mixes of concrete. Little time was allowed for this perusal so these articles were put aside temporarily and the menu became the chief source of interest.

A Tough Menu

A clever cover design by "Bob" Adams, '23, greatly enhanced the appearance of this important little article. On examination of the inside pages it was found that the usual "soup to nuts" arrangement was replaced by an order of things which began with Red Bridge Paint and continued through varied items such as Lubricated Ball Bearings to Creosote at the end.

However, fried chicken was none the less enjoyed for being called "Young White Pine Shavings"; and fruit salad masquerading as "1:2:4 Mix" and ice cream as "Neat Cement Paste, Strawberry Laitance" proved none the less tasty because of their distinctive engineering names.

Finally, when nothing remained but the smokes and "Creosote", President Spurney, '23, in the role of Toastmaster, rose to announce the various numbers in the program of entertainment, exercising to the full, both consciously and unconsciously, his prerogative to be humorous.

George Myers, '23, and S. H. Barlow, '23, made the first offering in the shape of two songs, accompanying themselves on their well-trained instruments. After scoring another triumph to add to their lengthy string, these entertaining musicians attempted to leave the scene to keep an appointment with "Tige" Jewett, but were compelled by the continued applause to return and give an extra number, which was also greatly enjoyed.

Mr. Fairbanks Talks

The first speaker of the evening was introduced in the person of Herbert S. Fairbank, C. E. '10, Senior Highway Engineer of the United States Bureau of Public Roads, and a former member of the Iowa State Highway Department.

Mr. Fairbank, by way of substantiating his topic on "Things I Don't Know", prefaced his remarks with a statement of his ignorance on technical matters. His address, which was of a non-technical nature, developed in general the idea that highway work is a growing branch of engineering, about which much is still unknown. "Our problem is further complicated," he said in effect, "because we must necessarily start in the middle of things. The railroads were able to make small beginnings, control their traffic, and build up to it; but our traffic, including some twelve and a half million motor vehicles, is already down on top of us."

To further demonstrate the unknown elements of highway engineering, Mr. Fairbank went through the steps in the attempt at solution of a typical road problem. The questions involved included:

1. Is there a demand for an improved road?
2. How shall the money be raised, and how shall the cost be apportioned to the various persons who shall derive benefit from the improvement?
3. What kind of a road shall be built? Shall the farmers be favored with a gravel road or the truck

drivers and tourists with a concrete boulevard?

4. Is the subgrade any good and how will it behave when covered with an air and water-tight pavement?

5. What is the effect of speed and weight of traffic and how shall they be regulated? What is impact and its effect?

By bringing up these points, Mr. Fairbank showed that much of the work of the highway engineer is based on intelligent guessing. He then outlined a plan by which the School of Civil Engineering might aid in relieving this situation, first by using its splendid facilities of men and equipment for research, and second, by interesting members of the graduating classes in the work of the Bureau of Public Roads sufficiently to cause them to take it up in the spirit of the pioneer. In closing, Mr. Fairbank pointed out that while the pecuniary gain was comparatively small, this was more than compensated by the honor coming from a good job well done.

The applause that burst out at the completion of the address served to prove, as one undergraduate remarked, that "We could have listened to Fairbank a while longer."

Mr. Dunlap Speaks

At this juncture, Toastmaster Spurney again arose and, after uttering several more or less appropriate remarks, introduced the next speaker of the evening, Mr. John H. Dunlap, formerly Professor of Hydraulics at Iowa State University and present Secretary of the American Society of Civil Engineers, a graduate of Dartmouth and a member of several honorary fraternities.

Mr. Dunlap began by expressing a doubt as to his ability to furnish a speech in line with the previous part of the program, inasmuch as a highwayman had already spoken and the toastmaster appeared to have small respect for the truth. After delivering himself of these gentle taps, Mr. Dunlap launched into his subject which was deduced by ardent followers of the toastmaster's little guessing game to be "The Professional Spirit."

Giving a brief résumé of the so-called "Golden Age", he pointed out that the worker of that time was considered as being a beast without a soul. Then, bringing his discussion up to modern times, he presented the status of the worker of these days as a contrast. The only man who counts for anything nowadays is the man who accomplishes something, and to be respected enough to become a leader of such people, one must possess an abundance of learning. It is this which distinguishes the professional man, in company with the fact that he serves the public intimately.

The Newest Profession

Mr. Dunlap then brought his remarks home by stating that the engineer had always possessed the first qualification and, since it is being realized more

and more that the engineer is a public servant, this oldest trade is now the newest profession. Having established the engineer as a professional man, Mr. Dunlap proceeded to draw up a set of specifications for this new type of engineer. The first three outlined applied to any professional man and were in brief:

1. He must possess a fund of general knowledge.
2. He must know himself, his abilities and limitations.

3. He must think, write and speak well.

His further qualifications for the engineer in particular included:

4. He must know the sources of engineering knowledge.

5. He must know the methods of applying this knowledge.

6. He must know costs and values, to be able to do for one dollar what anyone can do for two.

7. He must prove himself a true economic asset and a servant of the community.

Mr. Dunlap especially emphasized the spirit of service as being the true professional spirit, and stated that the engineer's claim to public service rendered could be based upon the development of the internal combustion engine alone. He further pointed out that many of those men serving the public at first hand as city managers and executives in public utilities corporations were engineers.

In conclusion, Mr. Dunlap imparted the information that the slope of the curve of progress is getting steeper and steeper, that the world is better today than ever before and that "the world is going to get still better in proportion as each man does his part to make it so."

Stunts and Applause .

The applause was so vigorous and continued that it appeared for a while as though the crowd had forgotten that public speakers are not in the habit of giving encores. When it was finally stilled the toastmaster announced a stunt, put on by J. D. MacDonald, '24, J. C. Johnson, '25, and D. S. MacDonald, '26. Their program consisted of songs and instrumental offerings which were especially enjoyable to many of their hearers.

As a final treat, A. H. Chapman, '24, turned loose his mellow voice for the benefit of the assemblage, which he did in a very pleasing manner, accompanying himself at the piano. A second number was demanded and then, when as a third number he rendered the classic, "O sole mio," the company kept on calling for more. Instead of vainly attempting to satisfy this desire, he swung into the well-known strains of the Evening Song, at which all must perforce rise and join in the singing.

This marked the close of the evening's entertainment, and since the toastmaster had previously offered a friendly warning against lingering too long

in Risley, the building was emptied in record time of the swarm of souvenir-laden banqueters.

Many favorable comments have been heard concerning the banquet, both as to food and entertainment, but the treasurer of the Association is yet to be heard from. However, it is understood on reputable authority that the nature of his report will be such as not to endanger the weakest of weak hearts.

BASKETBALL

Through defeating Arts by a score of 18-16 on March 15, C. E. jumped up to a three-cornered tie with Arts and M. E. At this time, the Finals will probably have taken place and we are prophesying strongly in favor of C. E. The team has worked hard, as shown by the standing, and the support from the sidelines has been very gratifying during the season. With such a team and a substantial cheering section, there is good reason to believe that our prophesy is by this time a reality.

S. P. E. E. CONVENTION

A matter of great interest to Cornellians, and to Cornell Engineers especially, is the announcement of the Annual Convention of the Society for the Promotion of Engineering Education to be held here at Cornell during Commencement Week from June 20 to June 23 inclusive.

This society has about sixteen hundred members, representing eighty-seven Engineering Schools; and in addition to the strictly engineering branches is interested also in such related subjects as English, Mathematics, Physics, Chemistry and Economics, and in the broader educational and administrative problems. Without doubt members of non-engineering departments of the University will find some of the sessions of interest.

The convention will be largely attended by presidents, deans, department heads, and leading professors of Engineering Schools, both of this country and Canada. Many of these men are Cornell graduates who will take this opportunity to revisit their Alma Mater and to renew the acquaintances of former years. Altogether it is expected that between three and four hundred members will attend this convention, many of them being accompanied by their wives.

That Cornell should be selected as the meeting-place of this representative and influential organization is a compliment in itself to the prestige of our Engineering College, and the Cornell Civil Engineer takes great pleasure in extending an early assurance of welcome to the Society.

In the near future, the Cornell Civil Engineer will publish an article by Professor Boothroyd, concerning the new telescope which has recently been completed at the University Observatory.

STREET TRAFFIC RELIEF

(Continued from page 78)

person's business. Such a division should be headed by an engineer well versed in general highway work and with a knowledge of the needs of industrial transportation. He should supervise the location of motor bus and interurban trucking routes within the city limits. His work should include street railway track work and extensions. Vehicle and pedestrian censuses should be taken at regular intervals. The best locations of taxicab and other public vehicle stands should be worked out with parties concerned at suitable places. The work of these divisions should be, in short, to centralize the work indicated, to determine facts and conditions, keep records, correlate data and look after the many and changing demands of street traffic as a unified interest.

Public Education Necessary

The ultimate success of any traffic regulations depend upon the public understanding and knowledge of causes and effects. The motor driver—local and transient—must be able to assimilate the essential rulings quickly and easily. This requires brief, clear signs on the streets and traffic rules in readable and

graphic form. Traffic regulations as written up in the usual legal manner are about as interesting as the dictionary. A traffic regulation map can be made to show at a glance the important points. A driving public, well conversant of not only the rules of the road but of the reasons therefore, will require less police supervision but will help enforce the regulations necessary to public safety and convenience. When States and Cities get together on these problems through both unofficial and official bodies and push through sane, reasonable and uniform regulations the public will respond. The engineer can help in many ways to work out and get across standards of practice so that the itinerant driver will understand and be understood.

There is relatively little literature on the subject of traffic relief and it is up to the engineer to make his ideas known by written word and spoken. Councils must be convinced and public prejudices must be overcome. We need ideas, discussions and intelligent thought on the subject. The engineer is a pioneer and traffic relief problems offer an almost untrod field—not for a new kind of engineering but for new applications of old principles along new lines.

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RECENT DEVELOPMENTS IN CONCRETE

(Continued from page 83)

say, however, that waters which are strongly alkaline should not be used, and, owing to the possibility that marsh waters may contain sufficient humus matter to affect seriously the strength of concrete they should be looked upon with suspicion until tested in concrete and found satisfactory. A safe specification is to require that the mixing water shall be potable.

Regarding the temperature of the mixing water, tests have been made, using water ranging in temperature from 32 degrees to 212 degrees F. It was found that the temperature of the mixing water had

very little to do with the strength of the concrete. The use of hot water is, however, a valuable aid in removing frost from the aggregate in cold weather, owing to its high specific heat, and may be used without danger of harming the concrete. Hot water tends to hasten the hardening of concrete.

(To be concluded in the May issue)

CHANGES OF ADDRESS

- '10 Edward H. Wells Jr.—from 743 Myrtle Ave., Albany, to 475 East 29th St., Brooklyn, N. Y.
- '12 Robert L. James—from 21 West 93rd St., N. Y. C., to Vacuum Oil Co., Rua da Horta Seece, 15, Lisbon, Portugal.
- '13 Harry T. Munn—from 76 William St., N. Y. C., to National Board of Fire Underwriters, 209 West Jackson Boulevard, Chicago, Ill.
- '13 Blinn S. Page—from 1530 Burlingame Ave., to 2455 Longfellow Ave., Detroit, Mich.
- '16 Leslie E. Pierce—from Box 440 (Gaylord Farm Sanatorium), Wallingford, Conn., to 129 Grove St., Stamford, Conn.
- '18 William M. Jones—from 480 Convent Ave., N. Y. C., to 54 West 14th St., Atlanta, Ga.
- '22 Abram Josefson—from 5 East Main St., Middletown, N. Y., to 917 West Water St., Elmira, N. Y.

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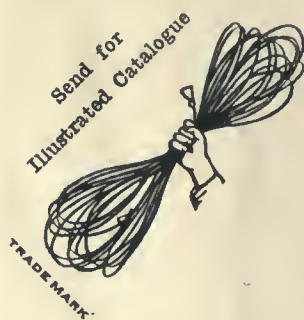
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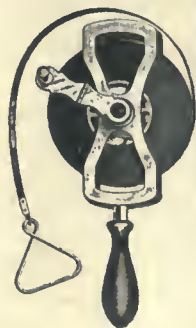


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THE HAROLD INGERSOLL BELL RESEARCH FUND

(Continued from page 85)

Mr. Bell was born on August 16, 1880, in Cantou, Ill., and prepared for college at Bay City, Michigan, High School. He spent one year at the University of Michigan transferring to Cornell in 1901 and received the degree of Civil Engineer in 1905. He was a good student, a popular member of his class, and was elected to Rod and Bob, one of the honorary upper class civil engineering societies.

In 1906, shortly after his graduation, Mr. Bell became connected with the H. P. Cummings Company of Ware, Mass. In 1912 this company opened an office in Portland, Maine, of which he was made manager. From that time until his death, over \$5,000,000 worth of contracts were executed by him for this company, the most notable of which is the hydro-electric development of the Rumford Falls Power Company at Rumford Falls, Maine. Mr. Bell was particularly interested in the development of hydraulic power and it is for this reason Mrs. Bell desires that the income of the fund shall be used for investigation in this particular field.

He was married on April 27, 1916, to Miss Ellen Morrell Foster, daughter of Mr. and Mrs. T. D. Foster of Ottumwa, Iowa, and they had made their home in Portland. She survives him with two sons, Hugh Foster and Gordon Humphrey, his mother, Mrs. Mary E. Bell of Ithaca, and two sisters, Mrs. Leonard H. Smith of East Orange, N. J., and Mrs. F. J. Howes (Bertha S. Bell '08) of Rochester, N. Y.

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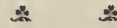
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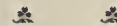
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If you are interested in the distribution of light through Factrolite, we will send you a copy of Laboratory Report—"Factrolited."

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MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

VOL. XXXI, No. 8

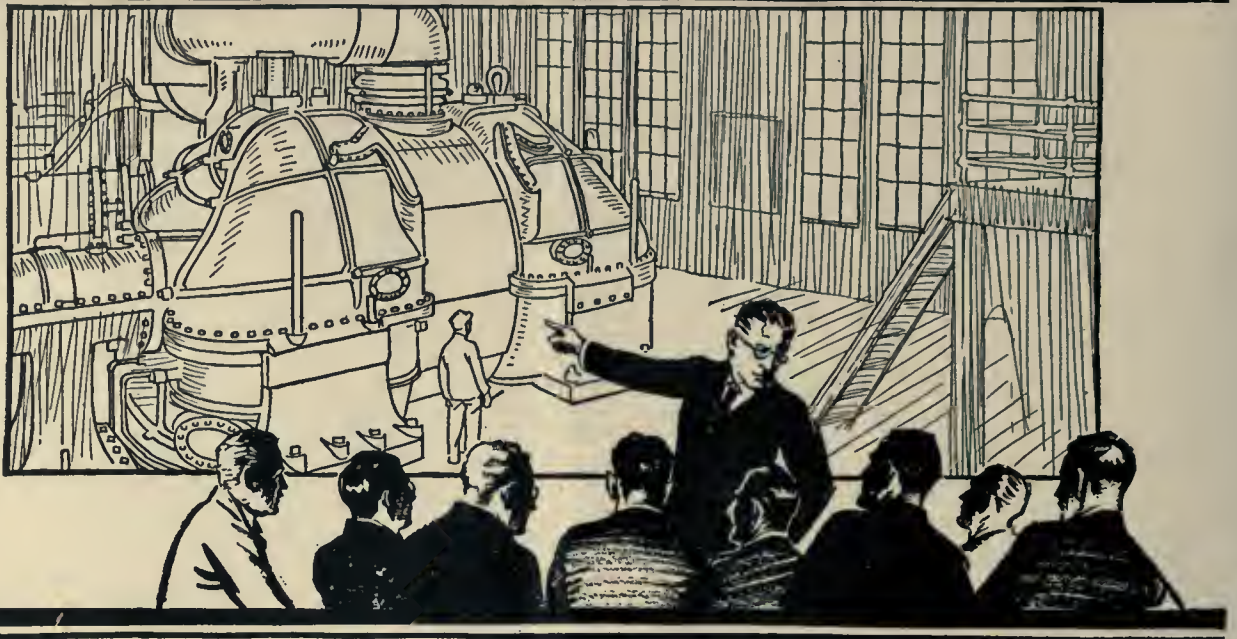
MAY, 1923



The New Telescope in the Fuertes Observatory

End Bearing Strength of Wood on Surfaces Inclined to Fibres

By H. H. SCOFIELD and E. N. BURROWS



The University of Engineering

Of all the things that go to make the successful engineer, none is more important, nor more in step with the spirit of the profession, than a studious attitude. One man says about another—"he is always willing to learn," "he doesn't think he knows it all"—and he intends to pay a high compliment when he says it.

The great engineers are always at school, always learning, always seeking for more knowledge. They begin with this desire for fuller understanding, and they keep it up to the end.

Any engineering operation, over and above the primary purpose for which it is carried out, is an active and post-graduate class in engineering, also. So that Westinghouse, or any other great business,

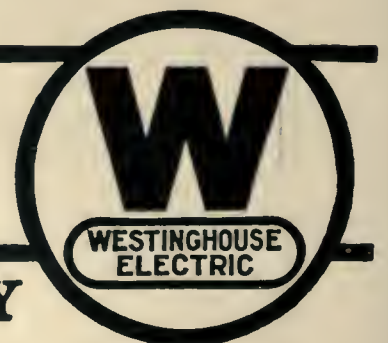
is, of its very nature, a University where theory and practice combine to make bigger, broader and more practical engineers.

The courses in this University are not limited to prescribed subjects nor terms—the subjects are almost infinite, and the semesters are endless. Men with the weight of years on their shoulders work and learn side-by-side with those whose day has just dawned.

This post-graduate school fits men for almost anything. Fits them for it, and makes them continually fitter. Out of this continuing fitness have grown the engineering accomplishments on which this institution has grown. It is, perhaps, one of the great educational institutions of its day.

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Building the Appian Way

Late in the fourth century B. C., Appius Claudius began a campaign for a road which would connect Rome with its southern provinces at Brindisi. The Roman Senate for a time balked at the great expense. Finally, Appius Claudius agreed to defray part of it from his own vast fortune.

Grading and digging stone for the road bed and pavement of this famous highway begun in 312 B. C. was a long, laborious task, which required thousands of soldiers and slaves.

The digging had to be done by hand. To obtain paving stones, slaves cut channels in the basalt to the required depth around the block, and then pried it out with iron bars. The smaller stones for ballast were chopped out with picks and hammers.

Appius Claudius cared little for time and labor. The cost of his methods would be prohibitive to the modern contractor, quarryman, or mine operator. Today, even dynamite, the great labor saver of this age, which has made possible a highway to the summit of Pikes Peak, has to be scientifically selected.

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Member of the Engineering College Magazines Associated

Vol. XXXI

MAY, 1923

No. 8

EDITORIALS

THE NEW BOARD

At the annual banquet of the Cornell Civil Engineer Board, the following elections for the 1923-24 board was announced: Robert T. Sprague '24 of New Berlin, New York, editor-in-chief; Claude L. Brownell '24 of Glens Falls, New York, managing editor; James H. Ludlow '24 of Pittsburgh, Kansas, alumni editor; Paul F. Beaver '24 of Long Meadow, Massachusetts, business manager; Miles C. Newton '24 of Ithaca, New York, advertising manager; and Joseph Bevacqua '24 of Rochester, New York, circulation manager.

The Board takes pleasure in announcing the election of J. E. Duffy '25 of Olean, New York, and R. E. Bonyun '25 of Penns Grove, New Jersey, to the position of Assistant Business Manager, as a result of the recent competition. The board also wishes to express its appreciation of the work done by W. S. Louchheim '25 and J. E. Jelley, Jr., '25.

ALL FOR THE ALUMNI

Cornell Civil Engineers will be glad to be assured that the June issue of the "Cornell Civil Engineer" will again be devoted to a directory of the living graduates of the School of Civil Engineering for all years up to and including the class of 1923. For all the alumni this list furnishes an invaluable reference of the latest address, occupation and society membership of the graduates. Many alumni have told us that this one issue of June justifies their year's subscription.

The first list of graduates published in 1893 comprised about 300 names while our directory for this year will contain over 2,500. It has become a grim and formidable task to compile this issue involving considerably more labor and expense than any of the other eight issues of the year.

Last year's June List cost 70 per cent more than any other issue of the year, while the sending of the cards to those from whom information is desired, and other work, is proportionally large. In fact we have questioned whether we are justified in this expenditure of so much time and money each year.

When the subject came up for discussion consid-

erable opposition was advanced toward the publication of a June list this year in view of the fact that we lost money on the publication of last year's list. Now we wish to ask you, the alumni, if we are justified in the publication of this list. Are we?

We believe that we are. We believe that the constant changing and continual growth of the alumni body year by year renders an annually revised directory a necessity—if the directory is to be of any authenticity as a reference. Also the opinions that alumni have expressed have confirmed our faith that we have the moral backing of the alumni in this difficult undertaking.

At the present time the June list is well under way, cards have been sent to the alumni about whom information is lacking, and of course these men will realize that we are counting on a prompt return of these cards with the desired information. The accuracy of the list depends directly on the individual cooperation of the alumni. With this information we can compile and publish the directory.

We honestly believe that we are doing something which is the wish of the alumni, for which they will be thankful, and which will prove valuable to them. Therefore in return we feel free to ask for financial support. Of course those who are subscribers are standing behind us, but there are many others who are not but who will be glad to know that we are having additional numbers of the list printed, which may be secured for fifty cents. We shall be mighty glad to furnish them. However, we would like to ask a favor. Will you not consider giving us a chance to put you in touch with the school itself in its varied and interesting activities, but especially with the more momentous and widely distributed actions of the world-wide body of alumni—with their successes, their changes of location, etc. We would like to show you that we have a magazine striving to serve the interests of the alumni who still retain their interest in Cornell and Lincoln Hall (and we know that there aren't many who don't). Will you give us the chance—by a year's subscription, beginning with this June List?

The Irving Porter Church Telescope of the Fuertes Observatory

Account of the recent purchase and installation of a telescope which has greatly furthered the study of astronomy at Cornell

By S. L. BOOTHROYD
Professor of Astronomy, Cornell University

The history of astronomy at Cornell University is naturally divided into three epochs. The initial period was before the building of the first Fuertes Observatory in 1902. The second period was from 1902 to the building of the new Fuertes Observatory in 1916 and the third period commenced in 1916. The building of the new Fuertes Observatory was made necessary by the tearing down of the first Fuertes Observatory in 1915 to make way for the new armory. The old wooden observatory which stood where Stimson Hall is now located, was built about 1880. Dean Fuertes commenced teaching astronomy in 1874 and he began teaching the practical astronomy with night observations in 1880. Both of these courses were given by him until he retired a few months before his death.

The observatory built in 1902 was first called the Barnes Observatory in honor of the donor, Gen. A. C. Barnes. However, because of the part taken by Dean Fuertes in developing the work in practical astronomy and his splendid efforts in aiding and encouraging Professor Crandall in giving a strong course in Geodesy, all concerned were pleased to have the name of the new Observatory changed, after the death of Dean Fuertes early in 1903, to the Fuertes Observatory. Before the building of the Observatory in 1902, what work was given in general astronomy had been offered by the Mathematics department but that department held that the instruction in general astronomy should be given in the college which had the observatory. Hence after the first Fuertes Observatory was completed in 1903, all of the work in astronomy was put in the College of Civil Engineering.

It is the writer's purpose in the present article to speak briefly of the third or present period and to say something of our plans and hopes for the future.

The Lens

Owing to the delays in completing the new observatory, and the partial suspension of regular work caused by our entry into the World War in 1917, we might say that the last period really began in 1919, when Professor Church made arrangements to get for the Fuertes Observatory two discs of glass for a 12-inch objective which had been ordered from the Mantois factory near Paris by the Yerkes Observatory. These were to be used for an objective

for eclipse work, the immediate use being for the solar eclipse of June 8, 1918. Owing to delays caused by the war, these were no longer of use to the Yerkes Observatory and so were released to Cornell University.

In March, 1919, the order was given to the John A. Brashear Co. to make these discs into a visual objective for a 12-inch equatorial for Cornell University. About May 20, 1920, the completed objective was received by the treasurer of Cornell University and stored for safe keeping in the vault at the treasurer's office to be kept until such time as the necessary funds were available for the purchase of the 12-inch equatorial mounting. During 1920 and 1921 Professor Church initiated and carried forward a movement to get contributions from C. E. Alumni to complete a fund for the purchase of the mounting for the lens which he himself had so generously provided. During the early months of 1921 the Cornell Society of Civil Engineers and the "Cornell Civil Engineer," aided by the unselfish efforts of a few individuals, did what they could to help augment this fund.

The Cornell Society of Civil Engineers itself gave a substantial contribution and by the fall of 1921, when the writer arrived to take charge of the work in Astronomy and Geodesy a goodly sum had been raised. During the fall of that year, it was proposed to call the telescope the Irving Porter Church Memorial Telescope and to make a further appeal to Alumni to complete the fund as a fine means of honoring one who has done so much for Cornell University and whose interest in Astronomy for its value in broadening, enlarging and uplifting man's vision, is known to all who have the pleasure of his intimate acquaintance.

The Mounting Obtained

In December, 1921, owing to a happy coincidence, the firm of Warner and Swasey of Cleveland, Ohio, through the kindly interest of a member of the firm, Mr. E. P. Burrell (M. E., '98) was able to make the University a most generous offer for the construction of the equatorial mounting for the 12-inch lens. This offer was so generous that, in spite of the fact that the full amount needed was not yet raised, the Trustees gave the order for the mounting early in January, 1922.

The mounting was finished and ready for shipment from the Warner and Swasey factory at Cleveland in July, 1922, but, owing to repairs and improvements to be made on the building and dome, it was not shipped until late in September and its erection in the dome was completed on October 16, 1922.

Final Funds Secured

During the spring of 1922, Dean E. E. Haske! Emeritus, who had already done much to bring the need of completing the fund for the purchase of the mounting to the attention of Alumni, came to the rescue and through his kindly offices in further bringing the need before the Alumni, the fund was completed during the late summer of 1922. The following is a list of those whose generous contributions have made possible the mounting for the lens which was provided by our beloved Professor Church:

Professor Church	(C. E. '73)
F. W. Olin	(C. E. '86)
J. W. Towle	(C. E. '94)
William Dalton	(M. E. '90)
Otto M. Eidlitz	(C. E. '87)
W. D. Kelley	(C. E. '81)
Thomas D. Merrill	(C. E. '78)
Daniel W. Mead	(C. E. '84)
Thomas S. Clark	(C. E. '94)
A. S. Crane	(C. E. '91)
E. J. Pearson	(C. E. '83)
J. N. Ostrom	(C. E. '77)
J. B. French	(C. E. '86)
John C. Wait	(C. E. '82)
Glenn D. Holmes	(C. E. '96)
G. E. J. Pister	(C. E. '01)
Blinn S. Page	(C. E. '13)
C. E. Chase	(C. E. '10)
Bertrand Weiss	(C. E. '09)
R. B. Williams, Jr.	(C. E. '01)
H. Krusi	(C. E. '82)
H. T. Munn	(C. E. '12)

Cornell Society of Civil Engineers

The lens is up to the usual standard of excellence attained by Brashear lenses and the mounting has all the latest improvements and the same incomparable excellence attained by all of the astronomical instruments turned out by the Warner and Swasey Company.

Has Photographic Lens

The photograph of the telescope on the cover was taken by Mr. Troy on a cold day in the latter half of March, 1923. The telescope is supplied with a photographic lens which makes it possible to take photographs without the use of color screens. The accompanying photograph is one taken of the moon near the time of first quarter on March 24, 1923.

The Astronomy Courses

There are three aims which it is incumbent upon a Department of Astronomy and Geodesy in a great

University to fulfil. One is to prepare that very limited number of students who wish to devote themselves to the precise work of Astronomy of Position and Geodetic Surveying. A second object is to give instruction to a somewhat larger group who may wish to prepare themselves for a scientific career as astronomers, mathematicians or physicists at some of the great research institutions of the world, or who contemplate a career as teachers of astronomy or some of the closely allied sciences. The third, and by no means the least important, aim is to aid in opening to many minds "larger physical worlds, larger intellectual worlds and larger moral worlds" as well as larger vision of the opportunities for noble service to mankind, a program which should be the first and highest aim of all education whether professional, technical or cultural.



PHOTOGRAPH OF MOON

Taken March 24, 1923. Age of moon, 7 days 12 hrs.

There are some who believe that all engineers should have training in precise work and that a good course in Geodetic Astronomy is the most effective method of giving this training. Dean Fuertes, Professor Crandall and Professor Leland were imbued with this idea and hence the prominent place which these courses were given in the College of Civil Engineering during the first epoch and the first half of the second epoch mentioned at the beginning of this article. This also explains the reason for the very fine and complete equipment of the Fuertes Observatory for instruction in Geodesy and Geodetic Astronomy—an equipment which I think it is safe to say is unique among American universities. The merits of this idea need not be discussed, but what I think we do need to stress is that no change in the training of the engineer or of anyone else, can alter the fact of the great need for making it possible to fulfil amply and adequately the third aim for which not only a Department of Astronomy

(Continued on page 105)

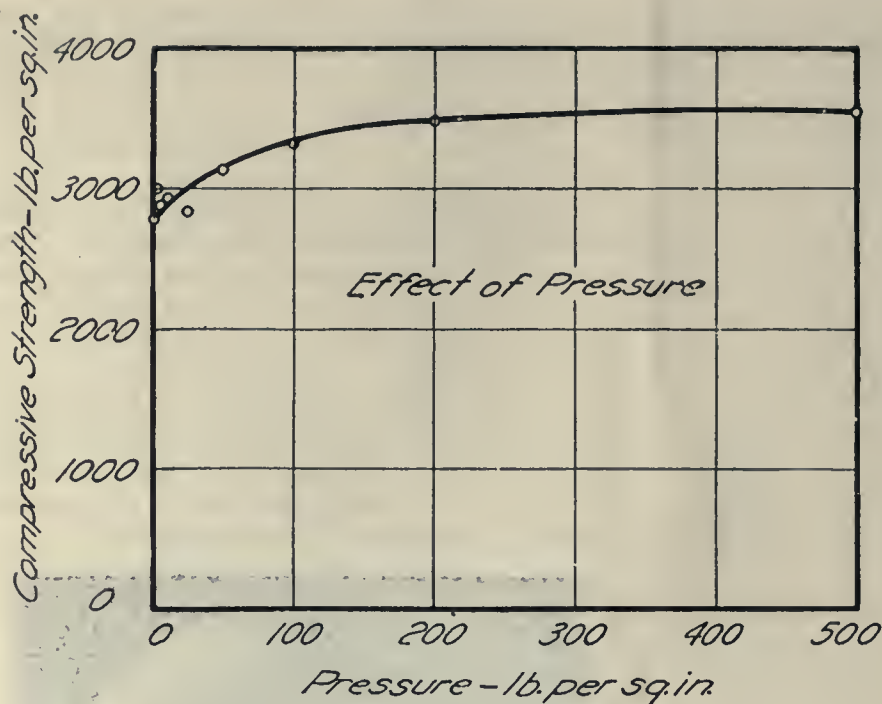


Fig. 9. Effect of Pressure Upon Freshly Moulded Concrete.

Note that the compressive strength is increased by pressure. This increase is directly proportional to the amount of water squeezed out, making a reduction of the water-ratio.

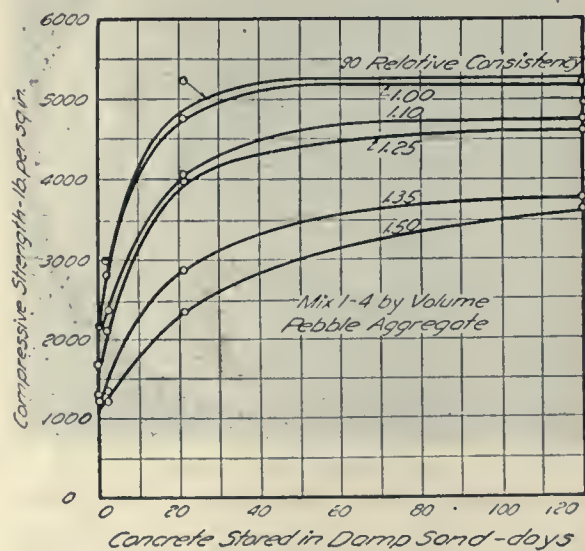


Fig. 10. Effect of Proper Protection During the Early Hardening Period Upon the Compressive Strength of Concrete.

Note that the greater effect is on the drier consistencies, but that even the wetter consistencies are more than doubled in strength by proper curing conditions during first 21 days

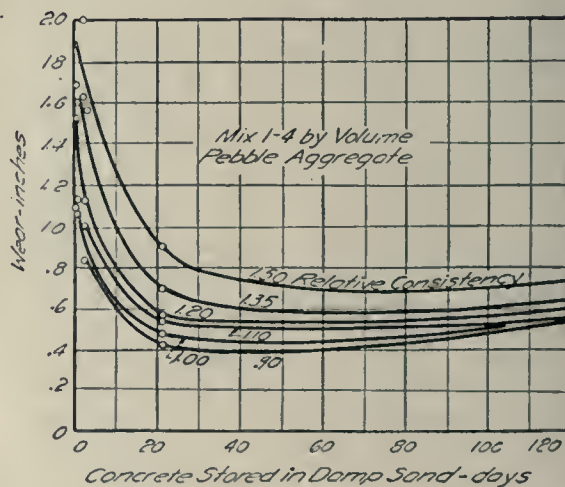
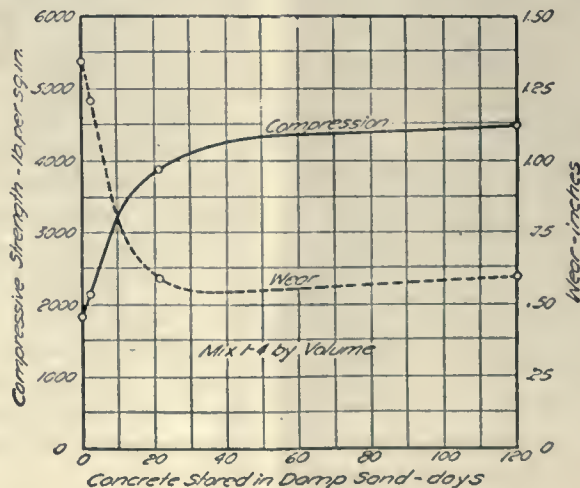


Fig. 11. Effect of Proper Protection During the Early Hardening Period Upon the Resistance to Wear of Concrete.

Note that the greater effect is on the wetter consistencies, but that the wearing quality of the drier consistencies is doubled by proper curing conditions during first 21 days.

Fig. 12 Effect of Proper Protection During the Early Hardening Period Upon the Compressive Strength and Resistance to Wear of Concrete.

Note that these curves are practically the opposite of each other, viz., the resistance to wear decreases, as the compressive strength increases.



Recent Developments in Concrete

By H. C. BOYDEN
Portland Cement Association.

(Continued from the April issue)

Proportioning

On studying the second phase of concrete making, there have been brought out at the laboratory, new, and in some ways radical changes in the past and present practices of proportioning.

These investigations have brought out the following facts, first, that the present method of designing concrete mixtures by using arbitrary volumes is wrong; second, that there is one single proportioning which will give the best results with a mixture of given fine and coarse aggregates; third, that adding to or reducing the amount of cement is of value only as it affects the relative quantity of water required to make a workable plastic mixture; and fourth, above all, that the water-ratio is the most important element of a concrete mix. The water-ratio as used by the laboratory, is the ratio of the volume of the water to the volume of cement in the batch. If 1 cu. ft. of water (7.5 U. S. gals.) is used for each sack of cement, the water-ratio is called 1.00.

The use of more cement in a batch does not produce any beneficial effect except from the fact that a plastic, workable mix can be produced with a lower water-ratio. The reason that a rich mixture gives a higher strength than a leaner one is not that more cement is used, but because the concrete can be mixed with a water-ratio which is relatively lower for the rich mixture than for the lean one. If advantage is not taken of this possibility of reducing the water-ratio the additional cement in the richer mixture is wasted.

Fineness Modulus

In studying the results of the tests of many samples of various combinations of aggregates it was evident that there must be some relation between the size and grading of the aggregates and the strength of the concrete. In trying to find this relation Professor Abrams struck upon what is called the "fineness modulus" of aggregates, and when this was compared with the strengths of the concrete a direct relation was found to exist.

The fineness modulus is a very simple function of the sieve analysis of the aggregate used for any particular concrete. The aggregate is analyzed with a selected set of U. S. standard square mesh sieves, each one of which has a clear opening double the width of the next smaller. The following sizes are used: 100, 50, 30, 16, 8, 4, $\frac{3}{8}$ in., $\frac{3}{4}$ in., $1\frac{1}{2}$ in. and 3 in. The percentages (by volume or by weight) of the total aggregates coarser than each sieve are added together, the sum of these percentages is di-

vided by 100, and the result is the fineness modulus. The fineness modulus of any combination of the fine and coarse aggregates may be found in exactly the same manner. Aggregates of many different gradings may have the same fineness modulus; or in other words, aggregates of many different gradings may be used and still secure the same compressive strength in the concrete.

It is not claimed that this method of designing concrete mixtures is the only one that will give the desired results, but the laboratory tests prove beyond a doubt that there is a direct relation between the compressive strength of concrete and the factor called the "fineness modulus." This is because the fineness modulus reflects the changes in the water-ratio necessary to produce a given plastic condition in concrete. Accepting this as a fact, it is possible to design a concrete mixture that will give a certain desired compressive strength from many different combinations of aggregates.

It is not possible in a paper of this length to go into the details of the use of this factor for the design of concrete mixtures, but they were published in the "Engineering News-Record" of April 17, 1919, and a careful study will enable one to use this factor successfully.

Abrams' Tables of Proportions and Quantities

In order to make these principles more easily available to engineers, architects, contractors and other users of concrete, Professor Abrams has worked out tables of the proportions and quantities required to produce concrete of compressive strength from 1500 to 4000 lbs. per square inch, at 28 days. All the tests for the determination of the factors in these tables were made of concretes of varying consistencies, formed into cylinders 6" by 12" in size and tested at the end of 28 days.

In conformity with present practice the aggregate is divided in the tables into fine and coarse, and covers combinations of five classes of fine aggregate with eleven classes of coarse aggregate.

Four different consistencies as indicated by the slumps of the concrete, are used for each combination so that there are 220 different combinations for each strength or 1320 combinations in all.

The quantities shown in the tables are considerably less than those shown in any previously published table due to the fact that they are absolutely net quantities based on laboratory methods of measurements of the aggregates. For this reason the quantities given should not be used for estimating

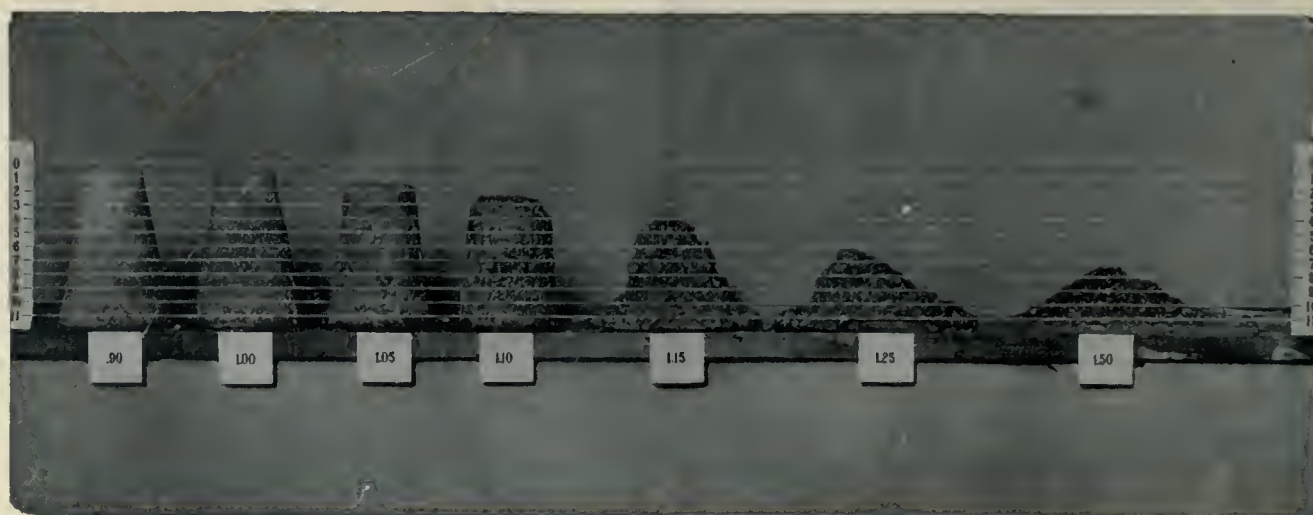


Fig. 14. Relation between Consistency and Slump

Note: Proper slump for roads and pavements from $\frac{1}{2}$ " to 1", for foundation and mass work from 1" to $1\frac{1}{2}$ ", for concrete containing reinforcing bars from 2" to $2\frac{1}{2}$ ".

without the addition of proper allowances for waste and the differences due to the practice of measuring aggregates in a loose condition when making field concrete.

These allowances should vary for each ingredient and also according to the particular method to be employed in handling the work. For general conditions the following percentages to be added to the table quantities are offered as a suggestion, cement 2%, fine aggregate 10% and coarse aggregate $7\frac{1}{2}\%$.

Water Content

Upon studying the water content, the most radical change from previous ideas on the design of concrete mixtures is found. Based upon thousands of tests it has been established that there is a direct connection between the relative quantity of mixing water used and the strength of the concrete and there is probably no other one factor which has so great an effect upon the strength as the water content.

It has been found that the less water used, as long as the mixture is plastic, and the aggregate is not too coarse for the amount of cement used, the stronger will be the concrete. This does not mean that the amount of water can be reduced too far, nor that, in actual construction, it can be reduced to a point that would give the maximum strength shown in laboratory tests. There is another factor that must be taken into account in construction and that is the workability of the mix. In general terms it can be stated that the lowest water-ratio should be used that will give a workable mix.

Within the range of plastic mixtures, the strength falls off very quickly with the addition of a small amount of water; so much so that in a one bag batch the addition of one pint of water more than is necessary to give a workable mix produces the same loss in strength as if two or three pounds of cement had

been left out. Do not think from this that a very lean mix with a small quantity of water will give as strong a concrete as a rich mix with the same quantity of water. This is not true, because it will require a higher water-ratio to produce a workable mix with the lean mixture, thereby causing a loss in strength.

The proper consistency for concrete will vary according to the use to be made of it. If the concrete is to be used for roads a dryer consistency is permissible than for concrete containing reinforcing bars. The use of mechanical tamping and finishing machines in concrete road construction has made it possible to use the dryer consistency economically, but any method which reduces the water content, such as the use of the light roller, will produce beneficial results.

The very wet sloppy mixtures that are being used in building construction may seem economical from the contractors' point of view, but they are certainly extremely wasteful from the designers' and owners' point of view, since in many instances 50 to 60 per cent of the possible strength of the concrete is being thrown away.

It may not be possible to reduce the amount of the water to the ratio necessary to give the maximum strength, but it certainly can be cut down below the amount commonly used, and the additional strength thus gained will be of advantage in the design of concrete structures. The designing engineer figures on a compressive strength of 650 lbs. per sq. in. and expects to get a factor of safety of three, but does not get it with the sloppy mixtures often used. By cutting down the water to the proper ratio, a factor of safety of five or six can be secured, or the present allowable unit stresses can be raised.

The exact amount of water required for any particular mixture of aggregates to obtain the greatest

strength in the concrete cannot be given, because of the impossibility of determining what amount will produce a workable mix and also because of the varying moisture content of the aggregate. However, a few approximate quantities for different proportions of well-graded aggregates up to $1\frac{1}{2}$ in. in size, may be given to form a basis for trial of the particular mixture at hand. A 1:2:4 mixture will require from 6 to $6\frac{1}{2}$ gallons of water per sack of cement, a 1:2:3 mix, $5\frac{3}{4}$ to 6 gallons, and a 1:1 $\frac{1}{2}$:3 mix, $5\frac{1}{2}$ to 6 gallons.

Slump Test

In order to have a simple method for determining the proper consistency in the field the slump test has been devised. At first a metal cylinder 6 inches in diameter and 12 inches high was used, but now a frustrum of a cone 4 inches in diameter at the top and 8 inches at the bottom, and 12 in. high has been adopted as a standard. This cone is filled with the concrete to be tested, which is carefully worked with a pointed metal rod while it is being placed, the form is immediately lifted off, and the settlement or slump measured. The proper slump for a mixture to be used for a concrete road surface is $\frac{1}{2}$ to 1 in.; for mass work, from 1 to $1\frac{1}{2}$ in. and for concrete to be used in structures with reinforcing bars, 2 to $2\frac{1}{2}$ in. In some classes of reinforced concrete work increased plasticity or flowability may be needed. It must only be obtained by adding cement as well as water, in such quantities as to maintain the proper water ratio, otherwise a serious loss in strength will occur.

Manipulation of Ingredients

In considering the final step—the manipulation of the ingredients during the making of the concrete—careful studies have been made of each operation. Included in this phase are the operations of mixing, transporting and placing, and also the curing or protecting of the concrete during the early hardening period, which is one of the most vital operations in the making of good concrete.

The time of mixing is a matter of importance in obtaining good concrete and as this factor largely controls the output of the mixer, it affects the cost of concrete. Consequently there is an unfortunate tendency to reduce the time of mixing, a practice which cannot be too severely condemned, because it results in a material loss in the strength of the concrete, and a lack of uniformity. Exhaustive tests made on concrete mixed in a batch mixer from 15 seconds to 10 minutes, show a rapid increase in strength for the first minute, and a slightly smaller increase for the second minute, after which the increase in strength is less pronounced as the time of mixing increases. This shows the necessity of mixing the concrete at least 60 seconds after all the ingredients, including the water, have been placed in the drum of the mixer, and not 20 to 40 seconds only, as is often done in road and street construction. There is no question

as to the advisability of using a batch meter on the mixer, provided one can be found that cannot be tampered with, in order to avoid controversy over the time of mixing and to insure a full minute mix. When a mixer is manufactured that will not permit discharge until a certain number of revolutions have been made at a certain speed this problem will have been solved.

The revolutions per minute of the mixer within the limits of 12 to 25 R. P. M. have but little effect on the strength of the concrete, so that a sufficiently wide variation for different machines is permitted. In making tests of the effect of R. P. M. on concrete the total time was one minute in all cases, and all materials, including water, were placed in the drum before the time interval was counted.

The effect of pressure on concrete immediately after moulding is found to be due to the amount of water squeezed out, making a consequent reduction of the water-ratio. Tests were made on concrete of the same proportions, by applying pressure from zero to 500 lbs. per sq. in. The water expelled was carefully collected and measured. It was found the strength increased quite materially with the higher pressures and this increased strength was almost directly proportional to the amount of water squeezed out. It is not surprising to find, then, that the duration of the pressure had no effect whatever on the strength of the concrete. Whether pressure was applied for a few minutes or for several hours the effect produced was exactly the same. It is undoubtedly the squeezing out of the water and consequent reduction of water-ratio that produces the excellent results when the roller method of finishing concrete roads is used.

The time that can be allowed between the time of mixing and the time of placing has not as yet been made the subject of extensive tests at the laboratory. This knowledge will be of value when considered in conjunction with central-mixing plants, which are used with success in many places. The time which may elapse between mixing and placing without injury to the concrete is probably governed to a certain extent by the kind of cement used, by the temperature of the mixed concrete, by the nature of the vehicle and the road over which the mixture is hauled. In Illinois a limit of 40 minutes lapsed time is allowed, but it is generally believed that the economical haul for the job will be the governing factor rather than the fixing of a time limit.

It is possible that some of the present ideas regarding this factor may be changed by the results of a series of laboratory tests, but until such a time it would not be advisable to allow re-tempering of concrete that has been too long in transit, as the addition of water will no doubt result in a reduction in strength.

(Continued on page VIII)

End Bearing Strength of Wood on Surfaces Inclined to Fibres

By H. H. SCOFIELD
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and
E. N. BURROWS
Asst. Professor of Bridge Engineering, Cornell University

Careful Methods of Testing Carried Forward in the Cornell University Materials Laboratory Have Established these New and Authoritative Values of Strength of Wood

The subject of safe bearing strength of timber on surfaces inclined to the fibers is an important one in timber framing. There has been considerable discussion of this topic in engineering literature within the past few years.* A lack of agreement between the Howe and Jacoby formulas has been brought out and also considerable differences in testing methods used to check these formulas.

It has seemed to the authors that proper methods of checking these formulas, or of devising new formulas from test results, would take cognizance of the following: (1) Shear failures should be eliminated from the tests; (2) The crushing of the fibers at their ends, i. e., at the surface itself, should be the quality or property involved; (3) The elastic limit is the point upon which tests should be judged and on which designs should be based and not any arbitrary amount of crushing deformation as 0.03 inches which has so frequently been used.

In explanation, it should be said that shear is taken care of separately in practical design of the body of a member. In tests in which shear is allowed to govern or produce the failure, the bearing strength of the fibers at the test surface may not be fully developed. Inasmuch as the body of a member is separately designed, the criterion for the joint details should be the strength of the wood fibers at the bearing surfaces. It should not be conceived that these joint surfaces should be stressed beyond the elastic limit of the material in actual practice, and therefore it seems evident that the elastic limit should be considered in tests. Moreover, it should be recognized that the stress at 0.03 inches deformation does not bear a fixed relation to the elastic limit, being well above that point in some woods at the higher angles and sometimes even below it at the smaller angles, i. e., when the force is perpendicular to the grain.

*Crushing Strength of Southern Pine at Angles to Grain, by Q. C. Ayres and Inclined-Bearing Tests on Douglas Fir and White Pine by Thomas R. Simpson both in Engineering News-Record of September 30, 1920.

Jacoby Formula for Inclined Bearing Recommended for Coniferous Woods by H. D. Dewell in Engineering News-Record of October 21, 1920.

Tests of Bearing Strength of Redwood Agree with Howe's Formula by R. R. Martel in Engineering News-Record of October 28, 1920.

The tests herein reported were made with the above points in view. The test pieces, Fig. 1, were

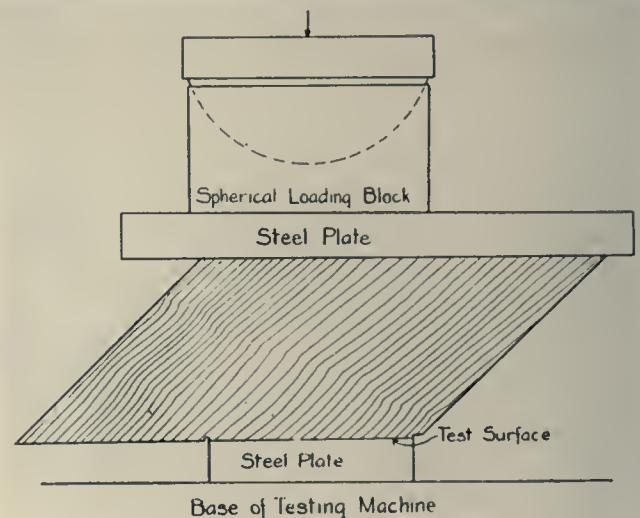


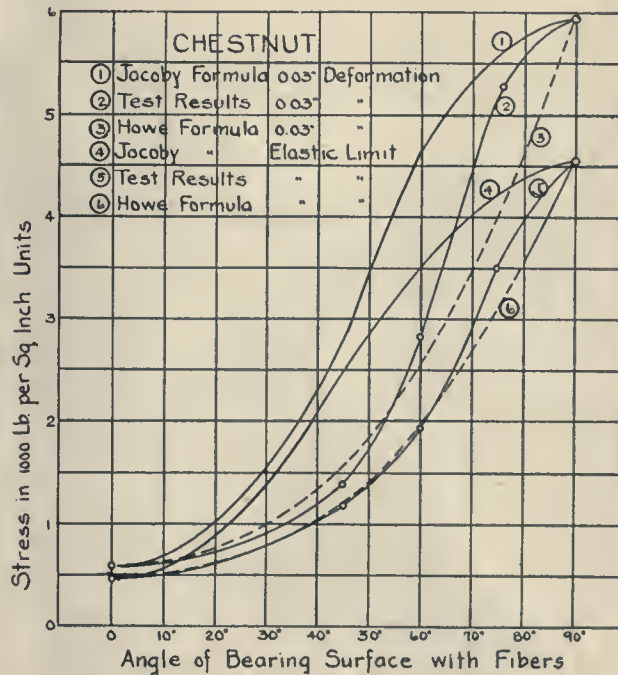
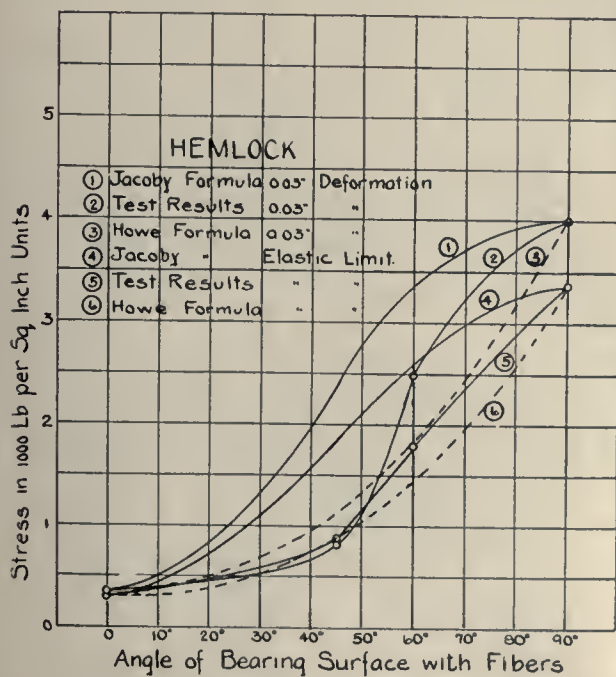
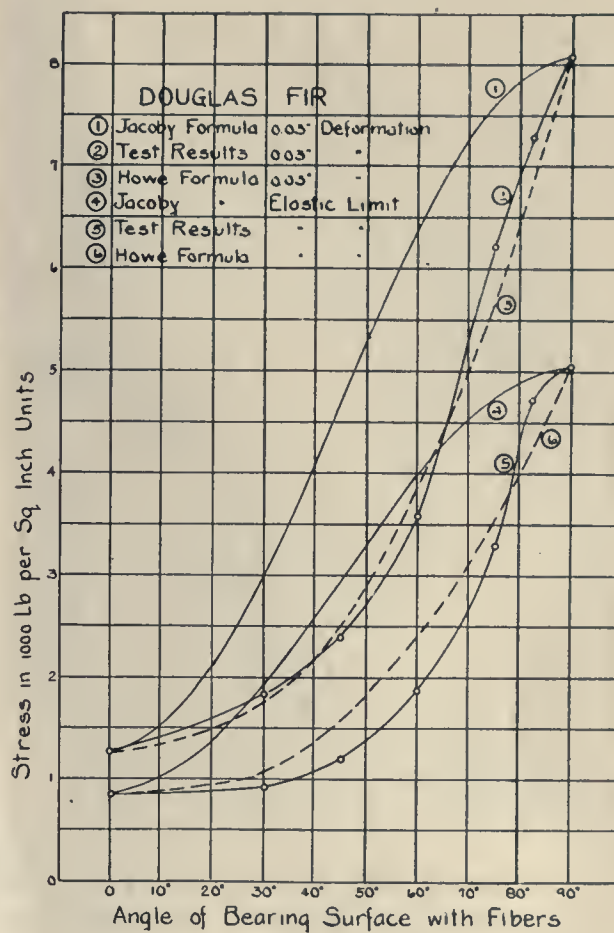
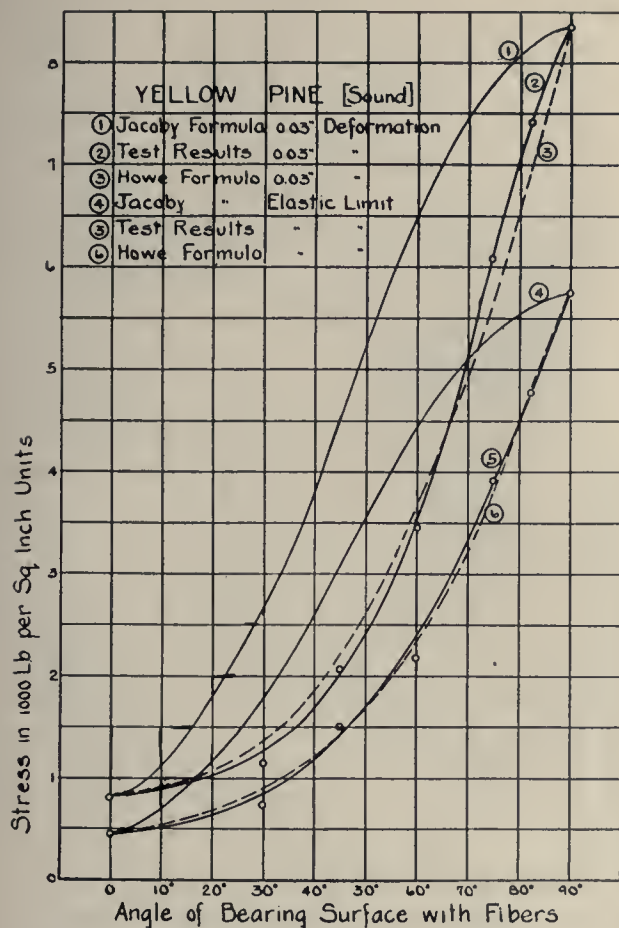
Fig 1

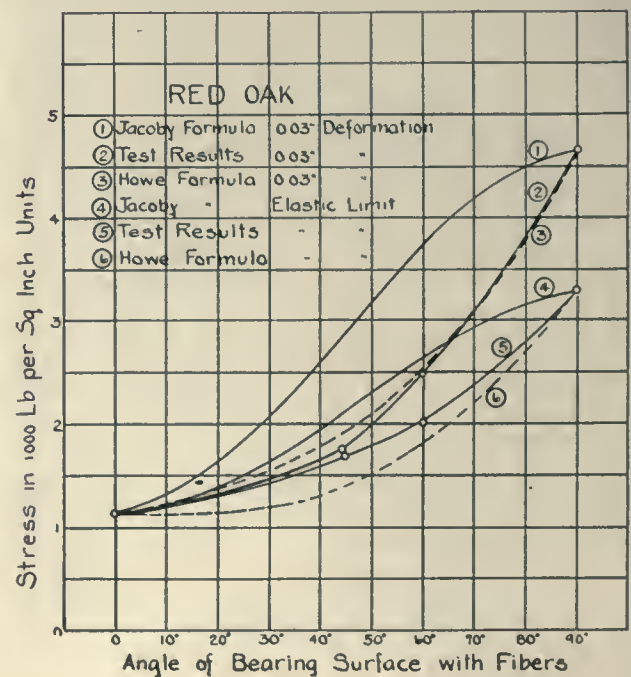
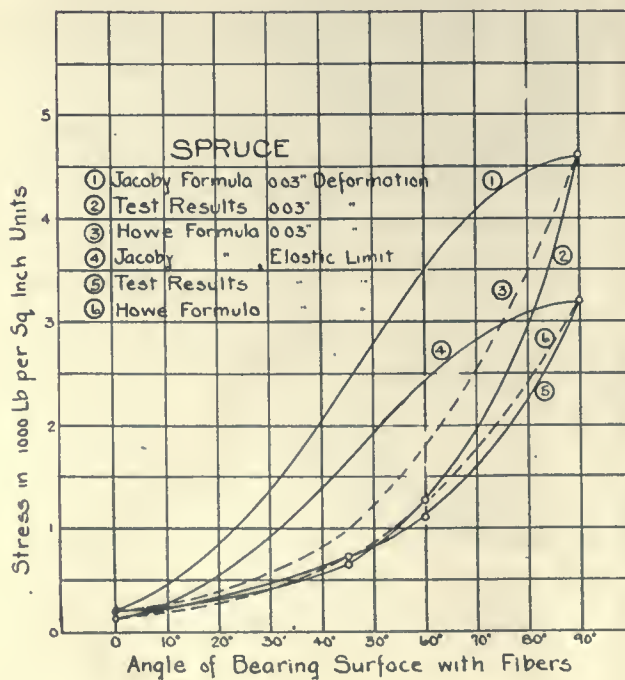
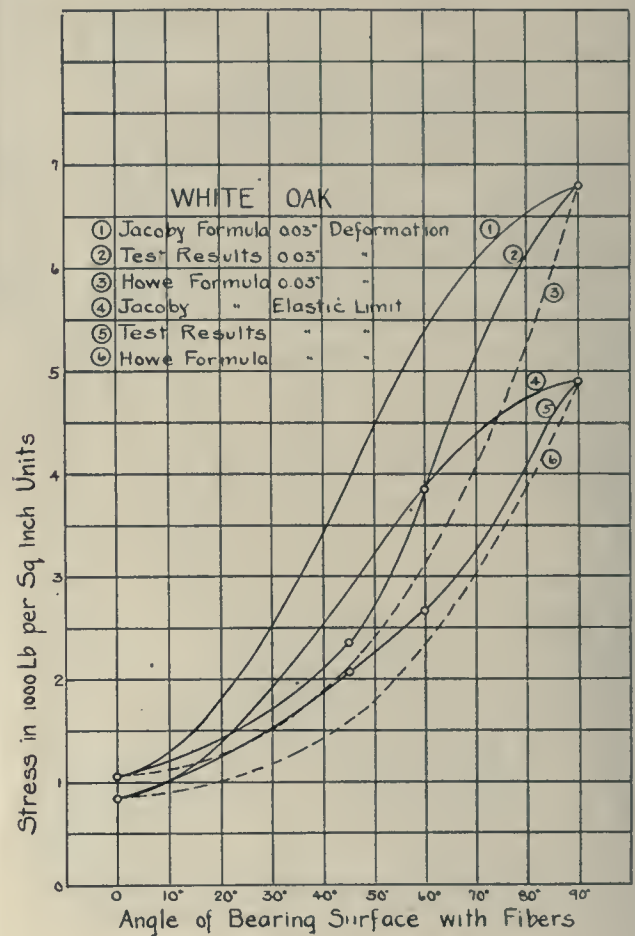
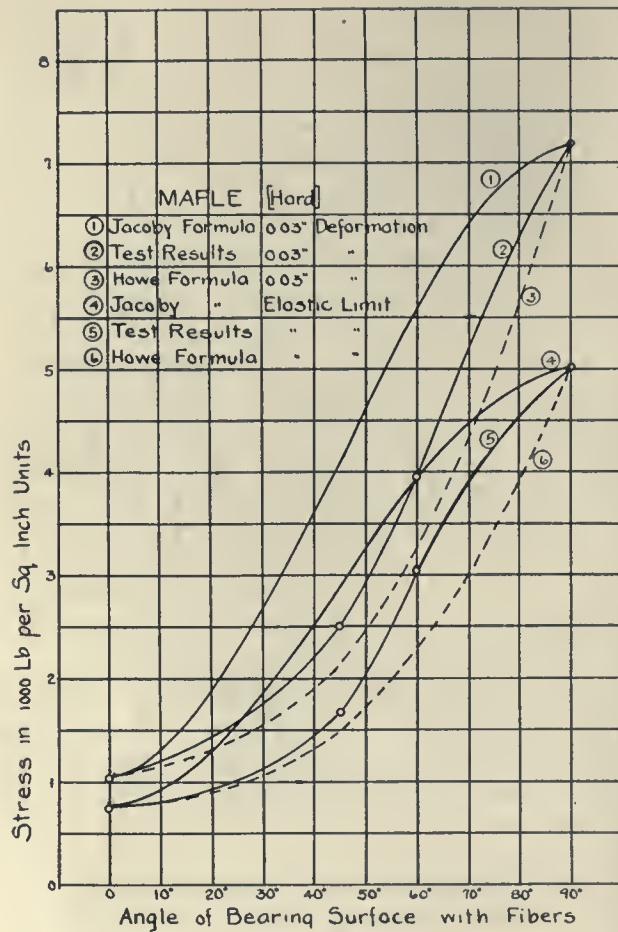
so shaped and proportioned that in all cases, the crushing took place at the ends of the fibers and no shearing failures along the fibers developed. While it was believed that the elastic limits should govern, yet for additional information the stress at 0.03 inches deformation was obtained and reported. The test specimens were cut from the same stringers in such a way that test surfaces were alike as to kind and growth. The test surfaces were all approximately $1\frac{1}{2}$ in. x $2\frac{1}{2}$ in. in section. The moisture was maintained at approximately the same value for all pieces "as" given.

The test specimens were loaded in a 50,000 lb. Olsen testing machine using a spherical bearing loading plate on top to transmit load to the test piece. Deformations were read by means of Ames dials reading to 0.001 inches. The elastic limit was determined by plotting loads as ordinates and deformations as abscissae, and taking the elastic limit as the load where the curve ceased to be a straight line, being the limit of proportionality between loads and deformation.

Results of the Tests

The results of the tests are shown in Tables I, II and III, and on the accompanying curve sheets.





The curves representing the formulas shown comparatively with the test results on the curve sheets are as follows:

$$\text{Jacoby, } n = p \sin^2 \Theta + q \cos^2 \Theta$$

$$\text{Howe, } n = q + (p - q) \left(\frac{\Theta^\circ}{90^\circ} \right)^{5/2}$$

where p = intensity of stress in end bearing

q = " " stress in cross bearing

n = " " stress on a surface inclined at angle Θ with the fibers.

Professor Jacoby's formula was developed theoretically while that of Professor Howe was derived empirically from tests of Yellow Pine.

It will be noted that there is closer agreement between the present test results and the curve representing Howe's formula at both the elastic limit and 0.03 inch deformation than with that representing Jacoby's formula. This is particularly true of the Yellow Pine and the Fir where more tests were made. In the hard woods while, for the angles given, the test results lie between the results of Howe and Jacoby, they approach nearer those of Howe's curve. As compared with the Howe curve, the test results are invariably a little higher for angles 70° to 90° and either approach quite closely or are under for angles 0° to 70° . The amount of disparity is not great in most of the woods tested.

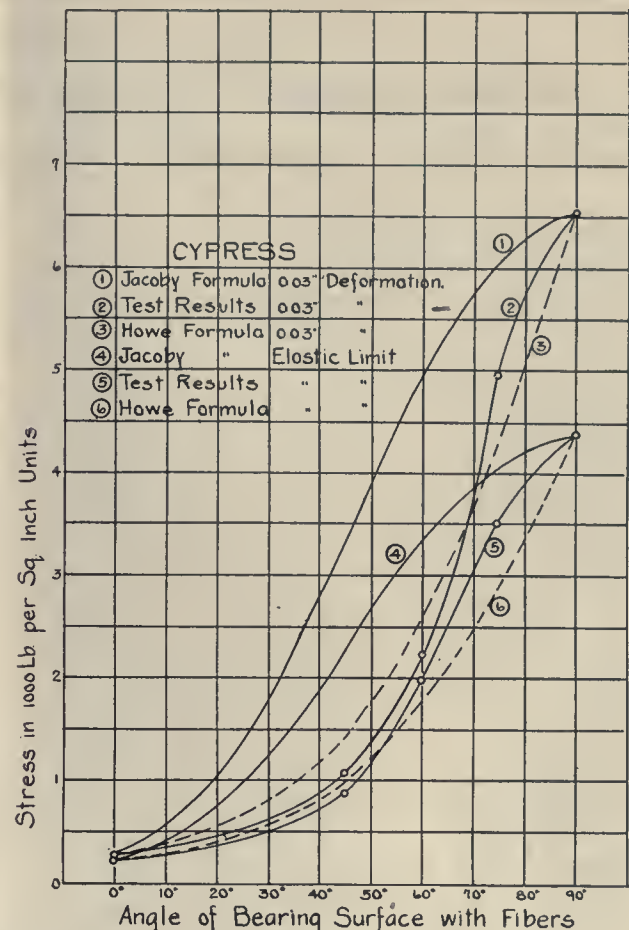


TABLE I

COMPRESSIVE STRENGTH OF TIMBER OBLIQUE TO THE GRAIN (LB. PER SQ. INCH)

Kind of Timber	Origin of Results	Angle of Fibers with Surface (Degrees)							
		0	30	37½	45	60	75	82½	90
Douglas Fir	Piece No. 1 Test								
	Elastic Limits	783	911	999	1168	1444	2577	4730	5060
Moisture: Max. 11.9	Piece No. 2 Test								
	Elastic Limits	944	937	—	1400	2458	3000	—	4110
Min. 7.4	Piece No. 3 Test								
Ave. 9.9	Elastic Limits	857	—	—	1133	1720	4208	—	5916
	Average Test								
	Elastic Limits	867 ⁽¹³⁾	924 ⁽⁵⁾	999 ⁽³⁾	1234 ⁽⁰⁾	1874 ⁽⁰⁾	3295 ⁽⁰⁾	4730 ⁽³⁾	5029 ⁽¹⁴⁾
	Jacoby (Formula)	(867)	1903	2399	2942	3986	4748	4955	(5029)
	Howe (Formula)	(867)	1152	1335	1602	2477	3537	4277	(5029)
	Piece No. 1 Test	1131	1677	1684	2229	3372	5138	7283	7730
	0.03" Deformation								
	Piece No. 2 Test								
	Ditto	1530	2025	—	2949	4183	7193	—	7730
	Piece No. 3 Test								
	Ditto	1135	—	—	1991	3201	6325	—	8991
	Average Test	1266 ⁽¹³⁾	1846 ⁽⁵⁾	—	2390 ⁽⁰⁾	3585 ⁽⁰⁾	6219 ⁽⁰⁾	7283 ⁽³⁾	8070 ⁽¹⁴⁾
	(0.03 deformation)								
	Jacoby (Formula)	(1266)	2964	3769	4663	6346	7603	7942	(8070)
	Howe (Formula)	(1266)	1732	2030	2466	3906	5631	6846	(8070)

(Note: The number of Tests are indicated in parentheses in the averages.)

TABLE II

COMPRESSIVE STRENGTH OF TIMBERS OBLIQUE TO THE GRAIN (LB. PER SQ. INCH)

Kind of Timber	Origin of Results	Angle of Fibers with Surface (Degrees)							
		0	30	45	60	75	82½	90	
Yellow Pine	Test								
	(El. Limits)	437	733	1500	2187	3935	4750	5750	
Moisture: Max. 9.7	Jacoby Formula	(437)	1765	3093	4419	5389	5657	(5750)	
Min. 7.1	Howe								
Ave. 8.5	Formula	(437)	801	1377	2497	3847	4787	(5750)	
	Test								
	(0.03" def.)	800	1146	2062	3450	6087	7406	8350	
	Jacoby								
	(Formula)	(800)	2690	4750	6460	7834	8214	(8350)	
	Howe								
	(Formula)	(800)	1317	2135	3710	5650	6980	(8350)	

(Note: Test Results are averages of at least four tests.)

TABLE III

COMPRESSIVE STRENGTH OF TIMBER OBLIQUE TO THE GRAIN (LB. PER SQ. INCH)

Kind of Timber	Origin of Results	Elastic Limits					0.03 Inches Deformation				
		Angle of Fibers with Surface (Degrees)					Angle of Fibers with Surface (Degrees)				
		0	45	60	75	90	0	45	60	75	90
Spruce	Test	136	719	1104	—	3190	200	642	1273	—	4603
Moisture:											
Max. 15.2	Howe (Formula)	(136)	676	1241	—	(3190)	(200)	979	1800	—	(4603)
Min. 10.5											
Ave. 12.5	Jacoby	(136)	1663	2430	—	(3190)	(200)	2401	3500	—	(4603)
Cypress	Test	221	868	1976	3505	4376	260	1088	2226	4970	6550
Moisture:											
Max. 14.7	Howe	(221)	955	1731	—	(4376)	(260)	1370	2542	—	(6550)
Min. 11.1											
Ave. 12.7	Jacoby	(221)	2298	3330	—	(4376)	(260)	3405	4975	—	(6550)
Hemlock	Test	340	865	1781	—	3352	345	803	2475	—	4407
Moisture:											
Max. 13.6	Howe	(340)	872	1430	—	(3352)	(345)	1062	1820	—	(4407)
Min. 9.9											
Ave. 12.4	Jacoby	(340)	1846	2595	—	(3352)	(345)	2376	3386	—	(4407)
Chestnut	Test	456	1142	1974	3505	4553	586	1398	2833	5280	5940
Moisture:											
Max. 14.1	Howe	(456)	1179	1946	—	(4553)	(586)	1533	2536	—	(5940)
Min. 9.7											
Ave. 12.3	Jacoby	(456)	2504	3524	—	(4553)	(586)	2753	4643	—	(5940)
Red Oak	Test	936	1673	2004	—	3275	1143	1992	2528	—	4637
Moisture:											
Max. 15.3	Howe	(936)	1349	1783	—	(3275)	(1143)	1760	2413	—	(4637)
Min. 12.2	Jacoby	(936)	2105	2691	—	(3275)	(1143)	2890	3766	—	(4637)
Ave. 14.1											
White Oak	Test	847	2040	2665	—	4893	1041	2349	3862	—	6790
Moisture:											
Max. 17.6	Howe	(847)	1562	2316	—	(4893)	(1041)	2056	3121	—	(6790)
Min. 14.1	Jacoby	(847)	2869	3882	—	(4893)	(1041)	3915	5360	—	(6790)
Ave. 16.1											
Maple	Test	734	1674	3047	—	5024	1012	2502	3993	—	7170
Moisture:											
Max. 14.0	Howe	(734)	1492	2294	—	(5024)	(1012)	2100	3252	—	(7170)
Min. 12.1											
Ave. 12.8	Jacoby	(734)	2879	3954	—	(5024)	(1012)	4091	5623	—	(7170)

Note: All values are averages of at least three tests.

Discussion

The present series of tests indicate that Howe's formula conforms more nearly to actual test results than does the Jacoby formula. The use of the latter in designing joint details would be in effect simply an artificial raising of the allowable stresses at all angles. The use of the Howe formula has been objected to on account of the necessity, in some cases, of cutting away too much timber in framing. It would seem to the authors that a more correct procedure would be to raise the allowable stresses if desired, and in any case, use a formula which conforms to actual results of tests and which therefore shows the inherent qualities in the material itself. In the case of the hard woods, these results indicate that a formula might be devised which would correspond even more closely than the Howe formula.

These tests also indicate that the allowable stress for bearing on the ends of the fibers parallel to the grain should be raised to be commensurate with that used when stresses are perpendicular to the grain. This is shown in Table IV in which the American Railway Engineering Association allowable stresses are quoted and also the ratio of the actual elastic limit test values to the A. R. E. A. values.

TABLE IV

Species	Fibers Perpendicular to Stress			Fibers Parallel to Stress		
	Test	A.R.E.A.	Ratio	Test	A.R.E.A.	Ratio
Douglas Fir	867	350	2.47	5029	1200	4.19
Yellow Pine	437	300	1.45	5750	1000	5.75
White Oak	847	500	1.69	4893	1000	4.89
Red Oak	936	500	1.87	3275	1000	3.27
Maple	734	500	1.47	5024	1200	4.18
Chestnut	456	300	1.52	4553	800	5.68
Hemlock	340	300	1.13	3352	900	3.72
Cypress	221	350	0.63	4376	1100	3.97
Spruce	136	250	0.54	3190	800	3.99

It is seen from this table that the A. R. E. A. allowable stresses are approximately one-half the actual for cross bearing and one-fourth the actual for bearing parallel to the fibers. This suggests that for joint details the allowable bearing stress parallel to the fiber might be doubled and bear the same margin of safety that exists when above allowable stresses for cross bearing are used. In the case of the soft Spruce and Cypress, however, the table indicates that the A. R. E. A. values are too high for cross bearing.

REMEMBER

The June Issue will contain the directory of all living graduates of the C. E. School including the class of 1923, with their home address, business address, occupation and society membership—a valuable reference. Single Copies are fifty cents.

ALUMNI NOTES

'89. Anson Marston, Vice-president of the American Society of Civil Engineers, has been appointed chairman of the committee on Student Chapters by President Loweth.

'01. Ezra B. Whitman, director of the American Society of Civil Engineers, has been appointed a member of the Committee on Student Chapters by President Loweth.

'10. Alfred S. Miriek has been appointed district engineer, with headquarters at Pittsburgh, Pa., for the Eastern Paving Brick Manufacturers Association.

'13. An eight pound son, whose "name will probably be Robert", was born on April fourth to Mr. and Mrs. Charles Weill at Monogahela City, Pa., where the proud father is assistant supervisor on the Pennsylvania Railroad.

'15. Howard B. Wright is estimating engineer for the Sennet Solvay Company, Syracuse, N. Y. Wright's residence address will be changed on May 1 to 412 Glenwood Avenue, Syracuse.

'15. James R. Rosenfeld has changed his residence address to 1443 Inverness Street, Pittsburgh, Pa.

'16. '17. Charles Eppleur, Jr., is selling steel for the Bethlehem Steel Export Corporation, 25 Broadway, New York. His residence address is changed to 963 Grant Avenue, New York.

'17. William B. Scheekel is in the engineering department of the Electric Bond and Share Company, 71 Broadway, New York.

'17. James A. Anderson is President of the Virginia section of the American Society of Civil Engineers.

'17. Leroy P. Raynor has been elected an associate member of the American Society of Civil Engineers.

'17. Harold Day is a bridge draftsman with the B. & O. Railway and is residing at 2750 Maryland Ave., Baltimore, Md.

'17. John O. Preston is Assistant to the President of the Warren-Knight Co., Philadelphia. He has charge of general administration and production problems and the final testing of instruments manufactured and repaired by the company.

'17. Chauncy M. Briggs is a consulting and supervising engineer, at 30 North Michigan Boulevard, Chicago.

'17. Roy J. Zanders is with the Plastering Constructing Company, Chicago, Ill.

'18. Ross W. McKinstry is with the Plastering Constructing Co., Chicago, Ill.

'19. Oscar J. Jewell is Assistant Engineer with the Division of Highways of the Department of Public Works and Buildings of the State of Illinois. His address is Box 233, Red Bud, Ill.

'20. Harold S. Fisher was married last August to Miss Irene E. Gill of Buffalo. They live at 85 Whitney Place, Buffalo, N. Y.

'20. Joseph H. Christian is with J. E. Sirrine & Co., Engineers, of Greenville, S. C. His address is 543 W. Washington St.

'20. D. G. Nethercot is with the Hill, Clarke & Co., Machinery Merchants, at 649 Washington Boulevard, Chicago.

'22. F. O. Schreiner and B. S. Sines are working for the Illinois Central Railroad. They are located in Chicago, Ill.

'22. William H. Van Pelt is with George F. Hardy, consulting engineer, 305 Broadway, New York.

'22. Forrest J. Brown is a designer in the Bridge Bureau of the New York State Highway Dept., 53 Lancaster Street, Albany, New York.

'22. Julius E. Havelin is a topographical draftsman under the department of docks in New York City.

In Memoriam

Henry S. Wright '72

Henry Swift Wright, C. E. '72, died as the result of a cerebral hemorrhage on February 25, 1923, at his home in Ithaca. He was born in Lexington, Tenn., on October 27, 1857. Soon after the death of his father in 1859, he came with his mother to Utica, N. Y., in which place he received his college preparatory work. In 1869 he entered Cornell on a scholarship in the School of Civil Engineering, where he remained until 1871. Due to ill health, he was forced to give up his profession early. For forty-five years, Mr. Wright was one of Ithaca's best known farmers and horticulturists. He was a Mason, a charter member and past master of Forest City Grange and a member of Tompkins County Farm Bureau. Mr. Wright was married on March 3, 1873, to Miss Inez Elizabeth Terrill of Ithaca. He is survived by the widow and by the youngest of his five children. An outstanding feature of the life of Mr. Wright was the unwavering loyalty and fidelity which he gave to the Cornell spirit throughout his life.

BOOK REVIEWS

ENGINEERING ECONOMICS

Engineering Economics, by John Charles Lounsbury Fish, Professor of Railroad Engineering, Stanford University; Member American Society of Civil Engineers; Member American Railway Engineering Association; etc., New York. McGraw-Hill Book Co., Inc. Second Edition. Cloth, 8 vo., pp. 297, xi and Index.

The first edition of this book appeared in 1915 and was quite favorably received as a "well conceived and admirably executed" treatment "of all the subjects it embraces". But while its thorough and painstaking analyses elicited praise, it was criticized on certain grounds. Making "salvage value" and "depreciated value" synonymous was considered by one reviewer an unwise departure from standard practice. The same reviewer made the claim that Professor Fish's proposed "Equal Profits Ratio Formula" for determining depreciated value was identical with Gillette's formula if "correctly interpreted". (Engineering and Contracting, Vol. XLIII, p. 386, April 28, 1915).

Another reviewer, Leonard Metcalf, M. A. S. C. E., Consulting Engineer, in the Engineering News-Record, Vol. 74, p. 357, August, 19, 1915, criticized the general treatment as tending "to bring into undue prominence formulas rather than methods and the relative importance of the elements of the problem". He further stated that "Completeness of treatment in such problems is rarely to be obtained in practice, and the most reliable estimator is the one who has the keenest sense of the important elements of his problem, coupled with the most direct and simplest methods of approach to and solution of it".

In this second edition, which is practically a new book, being fifty per cent larger and based on an entirely new thesis "choice of investment" instead of "economic choice of structure", Professor Fish has more than stood by his guns. That is, he not only uses the same nomenclature and repeats practically verbatim the discussion of depreciation formulas, but extends his mathematical treatment to investments.

His use of salvage value is logical from the standpoint of definitions given in the dictionaries and it can hardly be said that these terms have become standardized. It is to be hoped, at least, that fewer and simpler terms will eventually be used in valuation work.

His discussion of depreciation formulas, referred to above as having been repeated in this edition, pointed out the essential similarity of basis of all the formulas given, except the Matheson, and the fact that they differed only in the number of as-

sumptions made. Thus it would seem that the second criticism of the first reviewer was answered before it was made. However, the uncertainties involved in predicting the life of structures, to say nothing of the other unknown elements, make it seem futile to use these more complex formulas, either Gillette's or Fish's. In fact, the tendency is toward the use of the Sinking Fund Formula or even the still more simple Straight Line Formula. Two or three years error in the estimated life of the structure will usually produce a much larger error than variations in the other factors. Practically, there is also a tendency to leave out of account even scrap value for structures of long life.

In extending the mathematical treatment to cover a general case of choice of investment, the author has used an example which seems far-fetched, i.e., one which compares a loan of \$6,000 at 8% with a business venture requiring an investment of \$4,000. One wonders why the other \$2,000 is not otherwise invested if not needed in the enterprise.

Thus, while mathematically correct, it would seem that the author has gone to the extreme in the generalization of his problem. After all, the usual problem of the engineer is to investigate the financial feasibility of a particular project or the relative economy of alternate structures, i.e., economic choice of structure.

It is also believed that the choice of terms **reducible** and **irreducible** data, the latter meaning those qualities which cannot be expressed in dollars and cents, is somewhat unfortunate. The older and more usual terms **quantitative** and **qualitative** data would be more readily understood.

However, the completeness and the logic of this analysis are admirable, and while few engineering teachers will doubt the value to a student of following through most of them, many will be inclined to agree with Mr. Metcalf that some guidance should be given in how far to apply them in practice; such, for instance, as is given above in regard to prevalent practice in the use of depreciation formulas.

The book has been so extensively rewritten that it is difficult to entirely separate the new material from the old. The Introduction pictures the relation of the engineer to business enterprises and defines the field of engineering economics. Chapters II and IV analyse the problem of investment while Chapter III treats of interest, sinking funds, annuities, etc., in much the same way as the first edition.

Chapters V to VIII, inclusive, are devoted to much more extended analysis of first cost than was given in the first edition, including procedure in rop us a line, and we shall be glad to give you any

RETURNING ALUMNI, ATTENTION!

An event on the reunion program of major importance to all alumni, and especially to those of the Civil Engineering College, will be the dedication of the recently completed Irving Porter Church Memorial Telescope, described in Professor Boothroyd's article on page ninety-two of this issue.

Although the date, Friday, June fifteenth, and the place, Rockefeller A., are the only things definitely decided on at the time of publication, a tentative program has been drawn up. The principal speaker of the occasion will probably be Doctor Curtis, Director of the Allegany Observatory, who has already signified his willingness to attend. As plans now stand, the presentation speech will be made by former Dean E. E. Haskell, after which President Livingston Farrand will accept the telescope on behalf of the University.

If the sky is clear when the exercises are completed, the gathering will adjourn to the observatory, where visiting alumni will be given an opportunity to judge of the effectiveness of the new instrument and the tremendous benefit to be derived from its use.

EMPLOYMENT

The employment situation is improving steadily, though there is some danger of a curtailment of construction in accordance with the recommendation of Secretary Hoover. As has been pointed out in a previous issue, the most difficult task is to find the men best adapted to the positions offered, especially as these offers quite often come in by wire and the positions need to be filled immediately. Hence all men who would consider a new position are urged once more to send a record of their experience, a statement of the kind of position desired and of salary they would accept to Director Barnes at once. It would also be well to send duplicates to Mr. C. M. Chuekrow, Room 817, 19 West 44th Street, New York City, as he is chairman of the employment committee of the Cornell Society of Engineers.

Opportunities in Government Service are becoming more numerous and attractive with the increasing activities of the various departments, and alumni interested should watch the announcements of Civil Service Examinations in the Engineering News-Record. The demand for men is so great in some departments that no formal examination is required and graduation from a school of recognized standing often excuses one from part at least of the examinations.

There are also several openings for teachers of engineering, as well as openings on railroads, with bridge companies, highway departments, etc. Railroads are generally offering better salaries than they were a few years ago, and it is believed that this field is becoming more attractive in both emolument and opportunity for advancement. Highway departments need many men to carry out their extensive programs and some power companies are expanding their activities. There are also occasional

calls for construction superintendents, estimators, etc., sometimes for men of considerable experience.

Please make your desires known, therefore, even if you are employed, for we would like to help in securing better and more agreeable jobs as well as work for those at present unemployed.

F. A. BARNES,
Director.

ENGINEERING ECONOMICS

(Continued from page 104)

estimating, and Chapters IX to XI, inclusive, discusses the business units involved, including the need for them, the kinds and their creation and operation. These chapters are new, as are also Chapter XII on the Irreducible Data of the Problem of Investment, Chapters XIII and XIV on Business Statistics and XV on Miscellaneous Forecasts. Under business statistics are treated financial statements and cost keeping.

Chapters XVI and XVII are devoted to Valuation, including salvage scrap and wearing value and depreciation with formulas, much of which appeared in the first edition. Chapter XVIII discusses errors in estimating and Chapter XIX Engineering Reports.

Specimen "Articles of Incorporation" "Certificate of Incorporation", and "By-Laws"; Formulas and Tables; an extensive bibliography and twenty pages of questions and problems appear in the Appendices. A good index completes the book.

From the above it will be seen that the scope of the book has been greatly extended and the same painstaking thoroughness permeates all its parts as was evidenced in the first edition. While even more subject to the criticism voiced by Mr. Metcalf than was the first edition, in the hands of the practicing engineer acquainted with the limitations of practice or in the hands of a teacher able to point out where methods should be simplified or where refinements have been carried to excess, it is bound to prove of immense value. For, after all, the criticism applies to only a comparatively small portion of the text; the rest is sound, logical and illuminating.

F. A. B.

THE IRVING PORTER CHURCH TELESCOPE

(Continued from page 93)

and Geodesy but every basic department in a great University exists.

The New Telescope's Value

A good telescope is one of the material agencies which can greatly aid a Department of Astronomy in fulfilling this most important function. Ever since Dean Fuertes and those associated with him made possible the admirable equipment for the work in Geodetic Astronomy and Geodesy, Cornell University has fulfilled very completely the first aim of

(Concluded on page IX)



SCHOOL NOTES

C. E. MAKES CLEAN SWEEP IN FUERTES CONTEST

First College to Take All Three Prizes in Annual Affair

On Friday evening, April 20, a perfect score was registered by the C. E. speakers entered in the annual Fuertes Memorial Contest held in West Sibley 2, all three prizes being won by the three candidates from C. E. A. W. Crouch '23, speaking on "State Control of Bridges on all State and County Highways," led the successful attack by capturing the first prize of \$125. Second prize of \$35 was awarded to A. L. Rumsey '23 who spoke on "Abandonment of the Central New York Southern Railroad"; and third prize of \$20 was carried off by H. R. Buenano '23 who spoke on "The Need of a Pan-American Railroad."

The contest was hardly as well attended as it merited, but the audience though small, was an appreciative one. The presence of Charles H. Baker '86, donor of the prizes, added interest to the affair and not a little enjoyment when he consented to address the audience while the judges were making their decision. Mr. Baker spoke informally on his purposes for founding the Fuertes contests and enlivened his speech with anecdotes from his experiences. After an hour had passed the judges appeared with their verdict. The length it took to decide the victors can be taken as an indication of the evenly-matched character of the speeches. First place was accorded to Crouch after some discussion, but the judges reported that their greatest difficulty was in the disposition of second and third places. All of which goes to prove that C. E. won its notable victory in the face of stiff opposition.

An expression of thanks is due the victors from

the college who worked hard to place C. E. as the first college to capture all three prizes in the Fuertes contest; and Professor Walker deserves commendation for the lively interest he has displayed from the time the preliminaries were announced. With such a splendid mark to aim at it behooves all present juniors and sophomores to make plans for entering next year's try-outs. Since the winners are seniors they have left a challenge not only to the other colleges but also to the coming classes, to equal their record. 1924 and 1925 will have the first opportunity to attempt to "carry on" for C. E. and their respective classes. May they not be found wanting!

C. E. WINS BASKETBALL CROWN

Decisively Downs M. E. and Arts

The inter-college basketball season ended with the Civil Engineers at the top of the league this year. A triple tie between C. E., M. E. and Arts was played off and C. E. won decisive victories over both teams. This is the first time in several years that the Civil Engineers have won a basketball championship, and the second time in three years that a championship of any sort has been our lot.

The success of this sport was due largely to the consistent efforts of the Faculty advisor, Prof. Schofield and the manager, M. C. Newton, '24, in getting the men interested. The same problem faced these men at the start of the season that has always been the contention in C. E. athletics, namely the problem of keeping more than the few who were on the team interested. The only solution possible at this time seems to be that used by the manager. He made a practice of asking each man on the team and the substitutes to be present at the time of the game and secured either his promise to be there or

his refusal. When the men in the college as a whole take an active interest in the college activities there will be no need for these personal invitations. When all men having time or ability can be depended upon, there will be no question as to who shall be at the top in the inter-college league. We have as good men in the college as any other in the University, witness the Captains of Varsity sports in the college, and there is no reason why C. E. cannot take her place at the top in every sport.

The men who took part in this sport were very persistent in their efforts to be successful. At no game was there less than two substitutes available and sometimes there were several. It is the spirit that these few men had that exemplifies the spirit that will put C. E. at the top. The seven men who took part in a majority of the games and who contributed most to the success of the team have been awarded medals given by the inter-college athletic association. All others who were present, in uniform, at a majority of the games and who showed the desirable C. E. spirit, as well as the seven men winning medals, have been awarded shingles. All these prizes were awarded at the April meeting of the Cornell Student chapter of the A. S. C. E.

The following seven men were awarded the silver medals: L. P. Mains '23, W. Crawford '23, W. Barasch '23, W. M. Allen '24, C. M. MacWilliams '24, F. J. Dredla '24 and C. H. Adler '24. Shingles were given, in addition to these seven men, to the following: H. E. Burg '25, R. V. Palmer '25.

It is very evident that the reward for the services given is very adequate. It is so in every sport. The winning team is given medals, and members of the squad, shingles. There is no reason why the Civil Engineers cannot win more of these prizes. It is up to the individual, so get behind the school and help things along.

BASEBALL

There has been a very satisfactory showing in the baseball practices to date. A number of fellows have been out chasing the elusive pill and getting into condition for capturing the pennant in the inter-college league. More recruits are needed, however, so dust off your mitts and trot out on Alumni Field every Tuesday and Thursday afternoon. The first game is only a short distance away which means that each practice period should be well attended in order to get together a smooth-working combination.

C. E. STUDENT DIES IN INFIRMARY

J. D. Milmoie died in the University Infirmary on Friday, April 13 after a prolonged illness. Milmoie was a member of the class of 1925. His body was removed to his home in Canastota from which the funeral services were held.

CREW

Despite the fact that spring is still a thing to look forward to the C. E. crew is going out on the Inlet every Monday, Wednesday, and Friday nights and Saturday afternoons, besides working on the machines on the other days. The following men are working hard to carry the C. E. colors across the line in victory in the Spring Day regatta: E. N. Scott, Benham, Ripley, Hamburger, Rumsey, Pierson, Parrott, Downs, Skinner, Brookins, and Most.

TAU BETA PI ELECTIONS

Of the fifteen juniors recently elected to membership in Tau Beta Pi from the colleges of Engineering and Chemistry, four were representatives of the School of Civil Engineering. By a curious coincidence each of these four has also won success in a totally different field, which makes this accomplishment the more to be respected. The most recent additions to our group of intellectuals are:

Paul Fred Beaver, Long Meadow, Mass., Business Manager of "The Cornell Civil Engineer".

Frederic Kimball Lovejoy, Manhasset, N. Y., Captain of Track.

Charles Milton MacWilliams, Jr., Perth Amboy, N. J., Captain of Wrestling.

Frederick Conger Wood, Brooklyn, N. Y., Business Manager of the "Widow".

ENGINEERS TAKE UP FINE ART WORK

In following out a precedent established in former years, the Cornell Society of Engineers has appointed a committee to raise money among the former students of the Engineering College for the purpose of presenting to the University portraits of Dean Albert W. Smith '74 and Dean Eugene E. Haskell '79, the last-named being of the College of Civil Engineering previous to the reorganization. Any balance remaining will be used in the best interests of the College of Engineering. The chairman of the committee is Samuel B. Whinery '99, 95 Liberty Street, New York, and the treasurer is John D. Anderson '10, 125 East Forty-sixth Street, New York.

FACULTY NOTES

On March 22 Assistant Professor L. C. Urquhart '09 was the guest of the Cornell Club of Syracuse at their weekly luncheon, during the course of which he spoke on events at Cornell.

Professors Burrows and Perry attended the Annual Convention of the American Railway Engineering Association which was held at the Congress Hotel in Chicago from March 13 to 16. They report that the interesting and enthusiastic sessions of the convention were as usual largely attended. Professor Burrows is a member of the Committee on Rules and Organization of this Association. They also visited the National Railway Appliances Association's exhibit at the Coliseum which is held each year in connection with the A. R. E. A.

RECENT DEVELOPMENTS IN CONCRETE

(Continued from page 97)

Protection

The proper protection of concrete during the early hardening period is a detail of construction that is too often overlooked and many times only indifferently carried out. The effect of proper curing conditions upon the ability of the concrete to withstand abrasion has been very strongly brought out by numerous tests in the laboratory. There is probably no factor in the handling of concrete that so affects its wearing ability, as that of providing proper protection while curing or hardening.

It is true that any and all of the factors that tend to produce strength in concrete also tend to increase its wearing qualities; nevertheless all of our tests show that other factors being the same, the concrete which is properly protected will show much more compressive strength and much less wear than that which has been allowed to dry out too quickly. As an illustration of this, at the end of four months the compressive strength of a concrete of 1.25 consistency was about 1,700 lbs. per sq. in. when it was allowed to dry out in the air unprotected, while exactly the same concrete stored in damp sand for the first 21 days gave a compressive strength of about 4,000 lbs. per sq. in., and a correspondingly less wear in the rattler test.

One of the principal causes of the poor wearing resistance that is sometimes found in concrete floors is due to the practice of allowing them to dry out without proper protection during the hardening period. Concrete floors under roof should be kept moist just as outside roads and pavements are protected. Why throw away one-half of the life of concrete floors by failing to observe this rule and holding back from using them for so short a period?

The essential requirements for proper hardening are warmth and the presence of moisture, especially the latter. The tests show a nearly constant rate of increase in compressive strength and resistance to wear during the first 21 days of proper protection, after which the rate of increase gradually falls off. In deciding on the length of time that a pavement, or other structure, shall be kept covered and moist, it is simply a matter of deciding how much of the potential strength and wear resistance it is desirable to throw away, and reducing the 21-day period by that amount.

There are several methods of protecting concrete pavements and floors during the early hardening period, the most effective of which is the ponding method, and where the grades and other conditions will permit this method to be used, it will give the best results. The protection of concrete structures other than pavements is very often either neglected altogether or at best only half carried out. Many times the leaving on of the forms is considered to be sufficient protection in itself, but this is not so. The

(Continued on page IX)

THE DISADVANTAGE OF POOR LIGHTING.

As thousands of our industrial plants are operating to-day with poor lighting and in some cases with extremely bad facilities, it would seem that the importance of the subject of lighting has not been given the serious consideration by those responsible for such conditions.

Poor lighting is one of the most serious handicaps under which a manufacturing establishment can operate. First of all, poor lighting is the cause of a large number of accidents in industrial plants; and it is singular that accident reports do not yet properly classify the hazards of poor lighting, which in many cases is the primary cause of an accident attributed to what is really a secondary cause. Safety engineers and other officials who make accident reports should always consider the condition of the lighting when working up a report of accident causes, for it plays an important part in a great many casualties and is apt to be overlooked. All accidents due to poor lighting are accidents of neglect, and are preventable. The poor lighting accident hazard is clearly chargeable to management and not men. It is a difficult matter to make such progress with Safety First in a plant which has neglected to provide one of the fundamental requirements of accident prevention—good lighting.

Probably no one single factor connected with the equipment of a plant so directly affects the efficiency and inefficiency as the quality and quantity of the lighting. The curtailment of production of all working under the disadvantage of poor lighting represents a big loss each day; the poorer the lighting the less able is the working force to function efficiently. Quality and quantity both suffer, representing a preventable loss wholly removable by improving the lighting.

Under poor lighting condition, we cannot expect and rarely do we find an orderly, clean factory. Darkened places encourage careless habits and workers are often led to deposit discarded articles or material which should be deposited elsewhere. The eyesight of those who attempt to use their eyes continually in insufficient light, below nature's demands, is often affected. Too much light, such as is furnished by bright, unprotected lights, is as harmful as too little illumination; both are fundamentally wrong. Nature's own illuminant, daylight, is unequalled for our requirements of lighting.

The eye is best suited to daylight in the proper quantity. Sun glare should be avoided, and in the darkened hours proper artificial illumination provided. Daylight should be utilized to the fullest extent. It is supplied free in abundant quantity for our use. Modern invention has supplied a means whereby the interior of buildings can be lighted by daylight, and all the advantages secured which is furnished by good lighting at the smallest cost.

Industrial buildings should have as much wall space as possible devoted to windows fitted with Factrolite Glass, which insures the maximum amount of daylight and which prevents the direct rays of the sun from passing through as it properly diffuses the light.

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RECENT DEVELOPMENTS IN CONCRETE

(Continued from page VIII)

forms and all exposed surfaces should be kept thoroughly wet, or at least very moist, continuously for not less than 14 days, and whenever possible for 21 days or more.

Conclusion

Some of the more important developments resulting from the studies at the laboratory have been outlined herein, with two objects in view: First, to bring out the advisability of designing each concrete mixture to produce a concrete of a certain desired strength, with the particular ingredients available, and, second, to call attention to, and emphasize the important features in the making of good cement.

In reviewing the methods to be employed in obtaining good concrete there are two points which stand out above all others, and if these are followed more good will have been done than by following all other refinements put together. The first of these, is that the least amount of mixing water shall be used that will give a workable mix, and not one drop more. The second is, that no matter with what care the ingredients are chosen, proportioned, mixed and placed, a considerable portion of the beneficial results of this care will be nullified unless the concrete is kept moist during the early hardening period.

THE IRVING PORTER CHURCH TELESCOPE

(Continued from page 105)

a Department of Astronomy and Geodesy. The installation of the Irving Porter Church Memorial Telescope makes possible the more complete fulfilling of the second and third aims which have been mentioned. It is not thought wise that Cornell University should attempt to build up a great research Observatory but now that we have the center piece in the equipment for a fine student Observatory, Cornellians everywhere should join in a chorus of thankful praise to all those who have made possible this beautiful instrument.

With this as a nucleus and with the sympathetic and helpful cooperation given so unstintingly by Director Barnes, Dean Kimball, Professor Church

and others, Cornell University is confidently looking forward to possessing a student Observatory as finely equipped for work in all fields of astronomical interest as has been made possible in Geodetic Astronomy by Dean Fuertes.

Cornellians everywhere can do much by their helpful interest and cooperation to speed the day when our fondest dreams for the Fuertes Observatory as one of the leading student Observatories of America, may be more fully realized.

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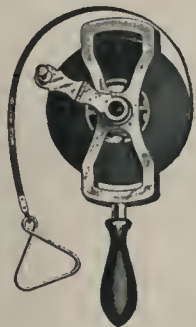
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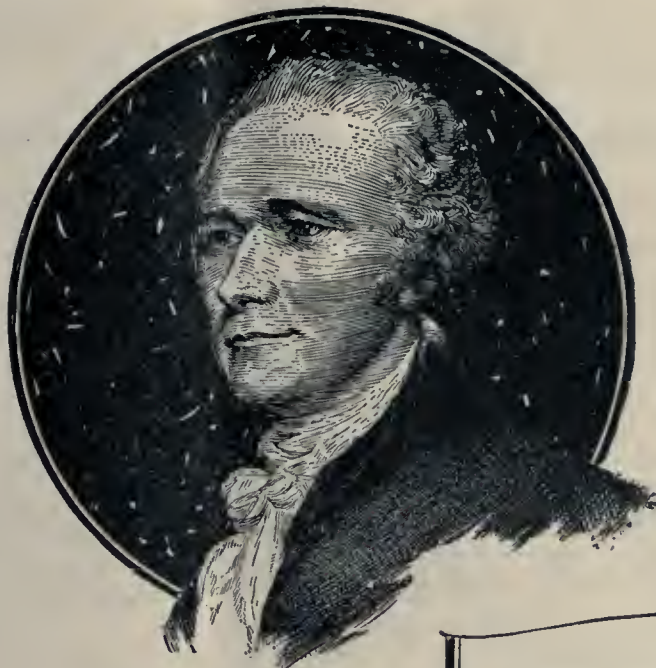
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Vol. XXXI

JUNE, 1923

No. 9

EDITORIALS

WE PRESENT AND WE PROPOSE

We herewith present a completely revised directory of all the living graduates of the School of Civil Engineering with the class of 1923 included. After each name we have entered the latest available information. In some cases this information is not all that we could expect, for strange as it may seem, some alumni failed to fill out and return our cards of inquiry. We invite correction, and the coming issues of the year will afford us an opportunity to broadcast these changes.

For the issues of the following year the policy of the magazine will not be radically changed from that of the past year.

We propose to enlarge and beautify the Alumni Notes. In enlarging them, the cooperation of students, alumni and faculty will be helpful in obtaining news. The labor involved in sending information, by card or otherwise, for publication is small but is highly worthwhile in promoting the success of the Alumni Notes. In beautifying the Notes we have been promised the cooperation of one of the Art Staff of the "Widow".

We shall continue to publish those articles which are worth while because of the engineering material that they present. We already have secured some articles for the fall issues which contain much novel and valuable engineering matter. As usual, we will turn chiefly to Cornell Alumni for articles, and we hope that this year we may have as fine and generous support as formerly.

Our School Notes will continue to present the activities of the men and teams of the college as seen from within the college. We shall avoid "university notes" because, for instance, a repetition by us of the activity of the varsity football team would become as monotonous as its list of victories. We want to boost the success of our intercollege teams. With one championship during the past year the C. E. teams can well hope to gain two or three next year.

Finally we want to keep the alumni and undergraduates fully informed concerning the research and experimental work carried on by the various de-

partments and the various faculty members, and the individual activities of the faculty and graduate students. Much of the value and the fame of the school rests with them.

MORE RESEARCH

In his address at the banquet of the Cornell Student Chapter of the A. S. C. E., Mr. H. S. Fairbank, C. E. '10, Senior Highway Engineer of the United States Bureau of Roads, brought out very forcibly the fact that a great deal of the work of the highway engineer is intelligent guessing. This is, in a way, disappointing because we think of the engineer as one who has eliminated guessing and substituted sounder methods of attack than even intelligent guess work.

Of course, several decades ago, everything was done by the "rule of thumb." Scientists and engineers may well congratulate themselves on the amount of such haphazard work that they have eliminated. There still remains, however, many problems that are solved by guess, and in many other fields besides highway engineering.

The elimination of the guess work of the past has been the result of scientific research, and the elimination of guesswork of the present is the problem of research. It is the trained scientific investigation of the principles and facts underlying any subject that will furnish the means of eliminating uncertainties in the solutions of problems.

Here in research work, as Mr. Fairbank pointed out, is a wonderful opportunity for the college organization with its splendid facilities of men and equipment. It is a chance for the colleges to perform a definite, practical and valuable service to the world. The colleges which seize this opportunity and make a success of it will find a quick reward in increased prestige in the industrial world and in natural and effective advertisement, besides the value to the college of the ownership of invaluable testing material and records. We are all familiar with the rapid advancement of some of the middle western colleges into the light of world knowledge through their research work.

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- Bechel, Charles H CE '15--2803 W Tuscarawas St Canton O
- Beck, Charles S CE '17--3232 Collingwood Ave Toledo O
Real Estate & Ins Pomeroy Fuller Co 214 Huron St
- Becker, Charton L CE '88 R D 1 Philadelphia Jefferson Co
Farmer [N Y]
- Beckman, Carl T CE '15--249 Main St Northampton Mass
Wholesale Confectionery Business
- Bee, Charles E AB MCE '15--RFD 1 Stephentown N Y
Dairy Farming
- Beebe, Roscoe C CE '92--818 Water St Elmira N Y
American Bridge Co
- Behrman, I Ellis CE '10--AMASCE 1121 E Baltimore St
Hotel Pariz Prague I Czecho Slovakia [Baltimore Md]
- Beitz, William E CE '13--316 W Center St Medina N Y
- Belden, Clifford H CE '99--34 Bristol St New London Conn
- Belden, George A CE '12--MAREA AMASCE
Architect Cent of Ga Ry Savannah Ga
- Bell, Nelson J CE '04--MECHD Dayton O
Chief Engr Schenck & Williams 904 Mutual Home Bldg
- Bellinger, Lyle F CE '87 MASCE Navy Dept Washington
[D C]
- Lt Commr CEC USN Submarine Base New London Conn
- Beltaire, Mark A Jr CE '02--57 Lawrence Ave Detroit Mich
Tech Sales Engr 805 Hammond Bldg
- Bemis, Lloyd E CE '19 MAAE 5647 Kenmore Av Chicago Ill
Appr Engr & Acct The Bemis Co 139 N Clark St
- Benisch, Henry J CE '20--895 Jamaica Ave Brooklyn N Y
Granite Mfg Jamaica Ave & Crescent St
- Bennett, Curtis B CE '19--JASCE 11312 Euclid Ave
Jun Asst Engr Cleveland Ry Co Cleveland Ohio
- Bennett, Ralph S CE '20--Plant Div Amer T & T Co 195 Broadway N Y C
- Bennett, Rowland K CE '18--Philadelphia Jefferson Co N Y
Engr McHarg-Barton Co 1328 Broadway N Y C
- Benson, Charles B CE '17--AMASCE 17 Allison Ave
Consulting Engineer Yonkers N Y
- Benson, G Milton CE '22--Mayfield Terr Halethorpe Md
Drftg & Desng B & O R R Baltimore Md
- Benson, Orville CE '88--MASCE Pequannock N J
American Bridge Co 30 Chnrch St New York City
- Benson, Walter V CE '17--Chatham N Y
- Bent, Reginald W CE '13--269 McLeod St Ottawa Can
Jun Hydrg llydrog Survey Dept Naval Serv
- Berger, Milton CE '22--100 St Charles Pl Atlantic City N J
Civil Engr Atlantic City Sewerage Co
- Berman, Herman CE '18--Washington D C
Assistant Examiner of Patents
- Bermel, Peter E CE '15--MSMIE Fort Humphreys Va
Captain U S A Corps of Engrs
- Bernstein, Max CE '16--Genl Mgr Laur & Mack Inc Contrs Niagara Falls N Y
- Berry, Harry V W CE '13--2577 Euclid Hts Blvd
Mgr Bldg Prods Co of Toledo 5005 Euclid Av Cleveland O
- Bertolet, Hyman E CE '99--Oley Berks Co Pa
Engineer
- Bertran, Juan M CE '18--P O Box 135 Humacao P R
- Beye, John C CE '83--MAAE MAREA MWeSE
Sen Engr ICC Div of Val 1901 D St N W Washington D C
- Bidgood, Carlos F CE '14--381 Myrtle Ave Albany N Y
U S Fed Aid Insptr c/o N Y State Hwy Comm Hudson N Y
- Biele, Frederick J CE '09--7622 Seventh Ave Brooklyn N Y
Sales Engr Ralph B Carter Co 152 Chambers St N Y C
- Bilderbeck, George L CE '06 MASCE MCnSCE Groton Conn
Pres Bilderbeck & Langdon Inc New London Conn
- Bird, Matthew M BS CE '12--AMASCE MAAE
Cons Engr Joor Engrg Co 601 Slaughter Bldg Dallas Tex
- Birkahn, Jacques CE '08--MAAE 51 E 129th St
Asst Engr Transit Comm 49 Lafayette St N Y C
- Birnbaum, Milton CE '12--Trudeau N Y
- Birner, Isador L CE '10--AMASCE 1154 DeKalb St Brooklyn N Y
Sales Mgr Graver Corp E Chicago Ind
- Bisbee, Ben H CE '01--523 Essex Road Kenilworth Ill
Contracting Engineer 175 W Jackson Blvd Chicago Ill
- Bishop, Hubert K CE '92--MASCE Washington D C
Chief Div of Constr U S Bur Public Roads
- Bizzell, William S BS in CE MCE '23 College Station Texas
- Blake, Henry E CE '73--Elsmere N Y
Asst Engr NY State Hwy Dept 53 Lancaster St Albany NY
- Blakelock, David H CE '23--619 Sixth St Washington D C
Captain USA QMC 1819 W Pershing Rd Chicago Ill
- Blakeslee, C Albert CE '03--Coal Glen Pa
Chief Engineer Jefferson Coal Co

- Blanco-Morales, H CE '15-----Santuree P R
Asst Engr Empresa Constructora del Puerto Ceuta Africa
- Blatch, Nora S CE '05-----Greenwich Conn
Cons Engr Liggett Building New York City
- Blaylock, John C BCE CE '07 MWSE 1232 Lake Ave Wil-
53 W Jackson Blvd Chicago Ill [mette Ill
- Blickman, Saul CE '11 Nelson Ave Long Island City N Y
Mfr Metal Specialties
- Blinn, Thomas W CE '12---749 Crawford Ave Detroit Mich
Desnr Special Work City of Detroit St Rws
- Bliss, Clarence R CE '11-AMASCE 89 Chestnut St N Adams
Office Engr Power Constr Co Worcester Mass [Mass
- Blog, Leon CE '15-----5419 Fountain Ave Los Angeles Calif
- Blundon, J Paul CE '17---JASCE JWVaEA Riverdale Md
Sen Asst Engr State Road Comm Keyser W Va
- Bobker, Harry CE '18-----54 Thatford Ave Brooklyn N Y
Pres Bobker Constr Co 16 Court St
- Boesch, Clarence E CE '06-----MASCE Durham N C
Cons Eng Gilbert C White Co Box 562
- Bogart, Robert D CE '08---620 W Second St Little Rock Ark
- Bogert, Clinton L CE '05---AMASCE 378 Morningside Terr
[Teaneck N J
- Prin Asst Engr Alexander Potter 50 Church St N Y C
- Bolger, Edwin G CE '13-----1107 19th Ave Altoona Pa
Dist Engr Peabody Coal Co P O Box 168 Marion Ill
- Bonner, John P CE '12---AMASCE 92 Euclid Ave Waterbury
Scott & Bonner Civ & Min Engrs Beckley W Va [Conn
- Bonsal, Howard V CE '23 7 E Greenwood Ave Lansdowne Pa
- Boorstein, Joseph A AB CE '05---344 80th St Brooklyn N Y
Asst Engr Finance Dept Room 610 Mun Bldg N Y C
- Booth, Raymond CE '10---AMASCE 30 Center St City Island
V-P C V York Cons Co Inc Box 298 Charleston S C [NY
- Booth, Russell C CE '11-----Groton N Y
Div Engr So Calif Edison Co Big Creek Calif
- Borges, Domingos G CE '15 Praca Justo Chermont 5 Para
Railway Engineer [Brazil
- Boright, William P CE '92 MCE '94-----Chatham N Y
Pres & Treas J W Boright Lumber Co
- Borst, George C CE '14---103 N Seventh St Wilmington N C
Aberthaw Constr Co Beverly Mass
- Boshard, John A CE '13-----472 E 2 North St Provo Utah
- Bosworth, Harlan P Jr CE '23---752 Niagara St Buffalo N Y
Asst Engr Calif & Ore Power Co Medford Ore
- Bowen, Corydon H CE '93-----502 W 3d St Sterling Ill
Train Master C & N W Ry
- Bowerman, Edwin R BS CE '09-----312 Ridgeway Ave
Gen Contr 25 E Main St Rochester N Y
- Bowes, Thomas F CE '91---MBSCE 54 Burton St Brighton
Engr in Charge of Sewer Service Boston Mass [Mass
- Bowles, Albert M CE '14---5405 La Branch St Houston Tex
Contractor 517 Preston Ave
- Bowles, Robert B CE '20---305 Avondale Ave Houston Tex
Engr Central Contrg Co 520 West Bldg
- Bowman, Ralph M CE '09---15000 Euclid Ave Cleveland O
c/o Otis Steel Co Box 694
- Bowman, William L CE '04 LLB-----
Attorney 342 Madison Ave New York City
- Boyajohn, H Milton CE '08-----MASCE Columbus O
Genl Mgr Boyajohn & Barr 8 E Broad St
- Boynton, Edmund P CE '93---852 Second Ave E Cedar Rapids
Wholesale Coffee & Tea Dealer 117 S First St E [Ia
- Bracho, José CE '14---2a de Napoles 34 Mexico City Mex
- Brady, Samuel D Jr CE '21 1201 Fairmont Ave Fairmont W
Chief Engr Brady-Warner Coal Corp [Va
- Brainard, Albert S CE '05 AMASCE 87 N 18th St E Orange
Engr Salesman S O Co of N J Newark N J [N J
- Brainerd, Harold A CE '07---AMASCE 2712 Chelsea Terr
Contrg Engr Am Bridge Co Continental Bldg Balto Md
- Bramhall, William E CE '77 LLB-----
Brandes, Fred C CE '16-----MSPEE Mamoreneck Rd
Transitman Dept of Public Works White Plains N Y
- Brannin, Franklin H CE '11---704 Varsity Rd S Orange N J
Structural Engineer 15 E 26th St N Y C
- Braunworth, Percy L CE '06-----MASCE Roseland N J
Cons Engr 671 Broad St Newark N J
- Brayman, George I CE '22-----Walton N Y
Engr Power House Constr Roneevert W Va
- Brewer, Isaac CE '89-----334 Huron Ave Sandusky O
Supt Constr Liberty Potash Co Green River Wyo
- Briede, Otto F Jr BE CE '09---1325 St Mary St N Orleans La
Mfr Wagon & Truck Bodies 416 Girod St
- Briggs, Chauncey M CE '17-----MISE 6530 Yale Ave
Cons Engr 30 N Michigan Blvd Chicago Ill
- Brigham, John C CE '08-----146 Maple St Summit N J
City Engineer City Hall
- Bright, William R CE '00---5716 Cates Ave St Louis Mo
Treas J H Bright Contrg and Bldg Co
- Brimberg Irwin CE '15-----1167 45th St Brooklyn N Y
Woolen & Coat Bus 30-34 W 26th St New York City
- Broekway, Leon M CE '08-----Woleott N Y
Mem of Firm Conway & Reid Rm 1009 709 Sixth Ave
New York City
- Brod, Burton W CE '14
MSAE 1411 Jefferson Ave E Detroit Mich
Eastern Repr Timken Axle Co N Y C
- Bronson, Howard F CE '10 MAAE AMASCE Harrisburg Pa
Chief Rural San Sect Engrg Div State Dept Health
- Brooks, Ernest PhB CE '03-----Cedarhurst N Y
Starrett & Van Vleck Archts 8 W 40th St N Y C
- Brooks, George G CE '94-----1549 Jefferson Ave Scranton Pa
Civil and Mining Engineer 700 Scranton Life Bldg
- Brooks, Landon M CE '14-----Sparks Md
Agent Franklin Fire Ins Co of Philadelphia
- Brooks, William E CE '13 616 Fairmont Ave Fairmont W Va
Chaplin Constr Co 609 Monongahela Bldg Morgantown
W Va
- Brower, Gerald E CE '16 MFAA 349 Rugby Rd Brooklyn
Capt U S Air Service McCook Field Dayton O [N Y
- Brower, Irving C CE '01-----MASCE MAAE MAWWA
City Manager City Hall Pontiac Mich
- Brower, Milton W CE '11---64 Walthery Ave Ridgewood N J
With Electric Bond and Share Co 71 Broadway N Y C
- Brown, Collingwood B Jr CE '01
MASCE MAREA MEIC Ithaca N Y
Chief Engr Op Dept Can Natl Rys Montreal P Q Can
- Brown, C Wesley CE '08---142 Trafalgar St Rochester N Y
Real Estate 53 Arcade
- Brown, Edgar T BCE CE '01 MAREA 1006 Weld St Little
Civil Engr P O Box 747 Clarksburg W Va [Rock Ark
- Brown, Forrest J CE '22-----East Marion N Y
Asst Engr Alabama Power Co Birmingham Ala
- Brown, George A CE '05---3300 St Mary's Ave Hannibal Mo
Jeweler 307 Broadway
- Brown, Grover C CE '06 MCE '09
MASCE MAAS MAAE 204 Fairmount Ave Ithaca N Y
Chief Civil Engr Cambria Steel Co Johnstown Pa
- Brown, Henry G Jr CE '22 32 N Arlington Av E Orange N J
Instrum Dixie Constr Co Alexander City Ala
- Brown, Homer C CE '97-----502 N 64th St Seattle Wash
- Brown, John W CE '12---53 Ludlow St Waterbury Conn
Asst Engr McClintie-Marshall Constr Co Pittsburgh Pa
- Brown, J Winthrop CE '14-----Millington N J
Engr Blenton Bldg Corp 342 Madison Ave N Y C
- Brown, Leigh A CE '12---102 Eighteenth St Buffalo N Y
Chief Engineer Iroquois Gas Co 311 Iroquois Bldg
- Brown, Leon R CE '11-----MRES 76 Winton Road S
Off & Field Engr N Y State Rys [Rochester N Y
- Brown, Morris E CE '12---43 Hawthorne Pl Montclair N J
Vice-Pres Stephen Ballard Rubber Co 90 W Brdwy N Y C
- Brown, N Adelbert CE '03 MRES 152 Post Av Rochester NY
Special Assistant Engineer 52 City Hall
- Brown, P DeWitt CE '13---235 Chestnut St Sewickly Pa
Drftsm & Desnr Fort Pitt Bridge Works Pittsburgh Pa
- Brown, Rodney D CE '13-----MAAE 3215 17th St N E
Hwy Engr U S Bur Public Roads [Washington D C
- Brownell, James P CE '91---MASCE MASTM Carthage N Y
Cons Engr 19 Strickland Bldg
- Bruen, Frank CE '78-----MAOU 29 High St Bristol Conn
Cost Engr The Sessions Foundry Co
- Bryan, Lemuel B J BCE CE '05---AMASCE Thomasville N C
Box 552 De Funiak Springs Fla
- Bryant, Carleton E Jr CE '22
426 S Columbus Ave Mt Vernon N Y
Engr Genl Bldg Mat Dept Johns-Manville Co N Y C
- Buchanan, George P CE '14---6113 Howe St Pittsburgh Pa
Gen Sales H J Heinz Co
- Buek, John A CE '15-----North Warren Pa
- Buckman, George F CE '17---Queen Anne Road Teaneck N J
- Budd, Percy H CE '09---AMASCE 84 Mtn Ave Summit N J
c/o W G Clark Cons Engr 8 W 40th St N Y C
- Buenano, Henri R CE '23 3024 Calle Echeverria Buenos Aires
Arg Rep S A
- Bullard, George P CE '18-----317 Eddy St Ithaca N Y
Draftsman McClintie-Marshall Constr Co Pittsburgh Pa
- Bullis, Abram R BS CE '82-----Macedon N Y
- Bunn, Charles H Jr CE '17---143 S Munn Ave E Orange N J
Civil Engineer Standard Oil Co Elizabeth N J
- Burdick, Roy D CE '14-----Cuyler N Y
Captain C A C U S A 61 Cleghorn Dr Honolulu T H
- Burés, Antonio S CE '12-----P O Box 514 Mayaguez P R
Cons & Contrg Engr
- Burgard, Willard H CE '16---30 Burgard Pl Buffalo N Y
c/o Lackawanna Steel Co
- Burkhart, Ernest D CE '13---482 Delaware Ave Albany N Y
Asst Engr N Y State Pub Serv Comm
- Burmistroff, Vassily G CE '23 Turovo-Kashin Tver Russia
Drftsmn Leonard Constr Co 1219 N Dearborn St Chicago Ill

- Burnell, Eugene D *CE '06 MASCE* P O Box 38 Sta H N Y C
Vice-Pres Overman Cushion Tire Co 250 W 54th St
- Burnham, Clifford J *CE '14*-----3811 Seneca Ave Los
Sen Civil Engr Los Angeles Co Flood [Angeles Calif
Control Dist
- Burnham, E Lewis *AB CE '07*-----Berwyn Pa
1301 Morris Bldg Philadelphia Pa
- Burns, Samuel *CE '22*-----741 W Main St New Britain Conn
- Burrage, John D *CE '14*-----337 Washington St Newton Mass
305 Academy St Jersey City N J
- Burrows, Earl N *CE '07 MCE '14*-----MAREA MASCE
Asst Prof Strl Engrg C U Ithaca N Y
- Burt, LeVan M *CE '01*-----940 President St
Asst Engr Bur of Hwys 50 Court St Brooklyn N Y
- Burton, Floyd E *CE '13*-----Gotham Apts Kansas City Mo
- Burton, Frank H *CE '13*-----Denver Colo
Partner Burton Seed & Prod Co 1500 Market St
- Burton, James T *CE '14*-----MESPh 60 Pearl Ave Oil City Pa
Engr South Penn Oil Co Pittsburgh Pa
- Burwell, Robert L *CE '01 MAAE MASCE* 21 Thompson St
Spec Aide Navy Dept Bur Yds & Docks Annapolis Md
- Bush, Harold W *CE '21*-----1810 S Seventh St Springfield Ill
Asst Engr Bur of Bridges Ill State Hwy Dept
- Butchers, Earle B *CE '01*-----604 Park Road Ambridge Pa
Engineer American Bridge Co
- Butler, William M *CE '01*-----309 Plum St Syracuse N Y
Vice-Pres & Treas Butler & Bedden Inc 950 Canal St
- Button, Ernest D *CE '99*-----449 N Aurora St Ithaca N Y
Pres J B Lang Engine and Garage Co 117-129 E Green St
- Butts, Harry W *CE '11*-----52 William St E Orange N J
Manager Hedden Place Machine Co Inc 40 Hedden Place
- Calloway, Robert W *CE '23*-----421 Linden Lane Merion Pa
- Cacho, Mariano M *CE '16*-----233 Gral Luna Manila P I
- Cadiz, Alvin G *CE '15*-----Sea Cliff N Y
Sales Engr Truscon Steel Co 31 Union Sq N Y C
- de Camp, Horace S *CE '09*-----317 Riverside Drive N Y C
Treasurer 56 Commercial St Brooklyn N Y
- Campaneria, Juan M *AB CE '13*-----MCuSE Consulado 114 Alt
[Havana Cuba
Civil Engr Central Sta Gertrudis Matanzas Cuba
- Campbell, Harry G *CE '14*-----33 Talbot Rd Baltimore Md
Supt Hbg W W Ext Harrisburg Pa
- Campbell, John B *BS CE '14*-----324 Church Ave Roanoke Va
Hydr Engr J B Campbell Co Bourse Bldg Phila Pa
- Canaga, Gordon B *AB CE '07*-----AMASCE 4754 N Ninth St
Civil Engineer [Philadelphia Pa
- Canfield, G Howard *CE '10*-----AMASCE Portland Ore
Hydr Engr USGS 606 Post Office
- Canfield, Harold T *CE '13*-----1135 Commonwealth Ave Boston
[Mass
Asst Constr Engr Chas H Tenney & Co 200 Devonshire St
- Cannon, Clayton P *CE '10*-----2618 Calvert St Baltimore Md
Constr Mgr B F Bennett Bldg Co 123 S Howard St
- de la Cantera, Fernando *CE '15* Bur of Insular Affairs Wash-
Prof Univ of Philippines Manila P I [ington D C
- Capen, Charles H Jr *CE '17* 30 Whittlesey Ave E Orange N J
Asst San Engr State Dept Health Trenton N J
- Carey, Matthew L *CE '15*-----YMCA Flint Mich
Realtor G A Kelly Co Genesee Bank Bldg
- Carlin, Joseph P *BS CE '97 MASCE* 270 Wash Ave Bkn N Y
Pres P J Carlin Constr Co 1951 G C T Bldg N Y C
- Carpenter, Charles W *CE '22*-----Lake Mahopae N Y
- Carpenter, Clarence C *CE '17*-----Ada O
Structural Engineer
- Carpenter, Frederick W *CE '84*-----MASCE Cornwall N Y
Consulting Engineer
- Carson, Richard B *CE '14*-----Woodlawn Inn Pittsfield Mass
1462 E 135th St E Cleveland O
- Carswell, David W *CE '12*-----121 St Marks Ave Brooklyn N Y
c/o The Texas Co Houston Texas
- Cartwright, Frank P *CE '15*-----AMCMA East Bloomfield N Y
Tech Secy Bldg Code Comm Dept of Commerce Wash'n D C
- Case, George W *BS MCE '12 AMASCE MESWPa* 3142 Ava-
Prof San Engrg Univ of Phgh Pittsburgh Pa [lon St
- Castillo y Grau, Antonio *CE '10*-----AMASCE MCuSE
Civil Engr 437 Central Park W N Y C
- de Castro, Anastacio F *CE '21*-----1136 Singalong Manila P I
Asst Civil Engr Bur of Public Works
- Caves, Stuart S *CE '16*-----Phelps N Y
Superintendent Lumber Yard
- Cesario, Frank *CE '16* c/o Antonio Cesario Port Chester N Y
- Chadeayne, Henry F *CE '18*-----Cornwall N Y
With Thomas A Edison Inc Orange N J
- Chaffee, Sidney L *PhB BE in CE CE '09*-----Chalmers Ind
Farmer
- Chamberlain, Jos J Jr *CE '11*-----AMASCE 1723 Grand Ave
Chief Engr Danis-Hunt Constr-Co [Dayton O
- Chan, Iu-Choo *CE '18*-----63 Fung Yuen Tai St Canton China
- Chan, Kwok Kie *BSCE MCE '23*-----Tung Park Koak Ku Yel
St Kwon Moon Kwongtung China
- Chandler, Albert H *CE '02*-----361 Gates Ave Brooklyn N Y
Asst Engr Queens Borough New York City
- Chandler, Edward A Jr *CE '17* 6208 N Park Ave Oak Lane
American Bridge Co Pencoyd Pa [Philadelphia Pa
- Chang, Cheh-Hsi *MCE '21*-----3 Ehr-Chin-Lee Tientsin China
Peking Government Univ Peking China
- Chang, Hai Ping *BSCE MCE '23* Wenmoasi Kaoyu Kiangsu
[China
- Chao, Shen C *CE '22 MCE '23*-----Yuhhsien Honan China
Draftsman Amer Bridge Co Elmira N Y
- Char, Kwang Yi *CE '12*-----7 Jessfield Road Shanghai China
Banking
- Chase, Clement E, *CE '10*-----AMASCE MASTM 410 Oak Lane
Prin Asst Engr Del Riv Br Joint Comm [Wayne Pa
- Chase, George A Jr *CE '14*-----1026 Linden Ave Baltimore Md
Mgr Claim Dept & Dir Home Friendly Ins Co
- Chase, Richard W *CE '05*-----109 Madison Ave Holyoke Mass
Investments Box 255
- Chavaune, John J Jr *CE '21*-----3969 Syosset St Woodhaven
c/o Nat Bd Fire Underwriters 76 William St N Y C [N Y
- Chen, Cheng S *CE '17*-----7 Gin Erh Huntung Lin Chin Kon
Instr Coll of Communications Peking China
- Chen, Mao K *CE '12*-----Lwai-Kiang Foochow China
Asst Engr River Improvement Comm Tientsin China
- Chen, Poo Wha *MCE '15 PhD '17*-----Yungting Fukien China
Engr of Constr Tientsin Pukow Ry Tientsin China
- Chen, Tsu Yi *MCE '22* 22 New Yang Shih Hsiang Hangehow
Desng Engr Am Bridge Co 30 Church St N Y C [China
- Cheston, James H *CE '21*-----89 Bruce Ave Yonkers N Y
Civil Engr Susquehanna Power Co Conowingo Md
- Chieng, Kwai *MCE '22*-----493 Myburg Road Shanghai China
- Chirlian, Gustave *CE '21*-----913 Longwood Ave New York City
- Chiu, Hsieh Chun *MCE '18*-----MChES MSSCh Chung-Jen
[Chenghsien Chekiang China
- Cho, Wen-Yueh *CE '16*-----
- Chobot, Edwin F *CE '21*-----129 Dean St Brooklyn N Y
Engr Converse Bridge & Steel Co Chattanooga Tenn
- Christensen, Eiler M *CE '21*-----East Liberty Y M C A
[Pittsburgh Pa
Estimator McClintie-Marshall Constr Co Oliver Bldg
- Christian, Joseph H *CE '20*-----Millville Pa
Asst Engr J E Sirmine & Co Engrs Greenville S C
- Christie, J G Carlisle *CE '14*-----92 Prospect Ave
[Hackensack N J
- Chu, Yueh Ting *MCE '21*-----48 Honan Road Shanghai China
- Chuek, Hong Sung *AB CE '12*-----AMASCE Tayeh Hupeh China
Mgr Pae Trading Co Russian Concession Hankow China
- Chuekrow, Charles M *CE '11*-----544 W 145th St N Y C
Chief Estimator Fred T Ley & Co Inc 19 W 44th St
- Church, Irving P *CE '73 MCE '78*-----AASCE 9 South Ave
Prof Appld Meeh and Hydr Emeritus C U [Ithaca N Y
- Churchill, John P *BS CE '01 MASCE* 19 Whittelsey Ave E
Chf Engr Hay Fdry & Iron Wks Co Newark NJ [Orange NJ
- Cianchini, Louis F *CE '16*-----Coama P R
Captain U S A San Antonio Tex
- Clapp, Robert V *CE '20*-----4403 St Clair Ave Cleveland O
Real Estate Mort & Loans 706 Williamson Bldg
- Clark, Arthur E *CE '02*-----MASCE 7 Colden Ave White
[Plains N Y
Asst Div Engr Transit Comm 441 E Tremont Ave N Y C
- Clark, Charles *CE '09*-----1010 Orville Ave Kansas City Kan
Civil Engr Kansas City Structural Steel Co
- Clark, Charles H *CE '92*-----MASCE MAREA MAEA
Engr M of W Cleveland Ry Co Cleveland O
- Clark, Lester P *CE '17*-----24 W Fern Ave Redlands Calif
- Clark, Otho M *CE '14*-----1330 Cherokee Road Louisville Ky
Sales Mgr Kosmos Port Cement Co 614 Taylor Bldg
- Clark, Robert W *CE '09*-----12 Stirling St
Pres Clark Constr Co Waterbury Conn
- Clark, Thomas S *CE '94 MASCE* 1436 E 17th St Brooklyn NY
Pres Custodis Canadian Chimney Co Ltd 95 Nassau St NYC
- Clark, William D *CE '15*-----Elks Club Fairmount W Va
By-Prod & Benzol Foreman Domestic Coke Corp
- Clausz, Irving C *CE '12 MAAE* 1484 Westwood Ave Lakewood
Engineer H L Carr Contr Cleveland O [Ohio
- Clawans, Edward *CE '17*-----32 Rutgers St Newark N J
- Clay, Leon G *CE '20*-----4132 St Charles Ave New Orleans La
With Gilbert & Clay Cotton Futures & Exporting
- Cleveland, Lou B *CE '07*-----261 Ten Eyck St Watertown N Y
- Clift, William B *CE '11*-----Omaha Neb
Vice-President Omaha Trust Co
- Clunan, Albert Jr *CE '12 AMASCE* 693 Flatbush Ave Brlyn
Asst Mgr of Pur J G White Engrg Corp 43 Exeh [N Y
- Pl New York City
- Cochran, Jerome *BS CE MCE '07*-----1518 Hamilton St
Secy-Treas Texas Genl Contrs Assoc Houston Tex

- Cochran, Thomas F CE '20.....74 Lenox Ave E Orange N Y
Produce Comm Moreland 290 Washington St N Y C
- Cockroft, Donald G CE '21.....Northport N Y
Commercial Engrg Dept N Y Tel Co 15 Dey St N Y C
- Codas, Alfredo B AB CE '12.....Azara 56 Asuncion Paraguay
[Paraguay]
- Coe, Ira J CE '94 MAIME 67 Santa Clara Ave Oakland Calif
Cons Engr 762 Mills Bldg San Francisco Calif
- Coffey, Philip T CE '14.....229 Newton Ave Astoria N Y
- Cohen, Abraham CE '11.....2109 Pitkin Ave Brooklyn N Y
- Cohen, Morris G CE '19.....R F D No 1 Box 66 Monticello N Y
Draftsman N Y & N J Bridge & Tunnel Comm N Y C
- Cohen, Paul CE '15.....569 W 150th St New York City
- Cohen, Samuel CE '09.....219 Pulaski Ave Brooklyn N Y
- Coit, Charles W CE '00.....Bowmanville Ont Can
Export Genl Motors Ltd Oshawa Ont Can
- Collett, Walter J CE '15.....1061 E 19th St Brooklyn N Y
Tatta Iron & Steel Co Jamsledpur Bengal India
- Collins, A Stuart CE '18.....717 Lafayette Ave Buffalo N Y
With Lackawanna Bridge Co
- Collins, Charles W CE '89.....Greenwich N Y
Special Track Work Engr Lorain Steel Co Johnstown Pa
- Collum, Thad L CE '21.....702 S 15th St Corsicana Tex
Inst School Civil Engrg Ithaca N Y
- Colnon, Redmond S CE '87.....AMASCE 6417 Columbia Ave
Fruin & Colnon Genl Contrs 408 Olive St St Louis Mo
- Colsten, Albert L CE '95.....AASCE 1556 73d St Brooklyn N Y
Principal Brooklyn Tech High School
- Coltman, Robert Jr CE '06.....MWNSE 1460 Irving St Wash DC
Engr Chas H Tompkins Co Genl Contrs 1612 Park Road
- Comstock, Charles W CE Met E MCE '94 PhD '98.....MASCE
e/o Dwight P Robinson Co Inc 125 E 46th St N Y C
- Conant, Frederic W CE '14.....Los Angeles Calif
Builder 111 Carondelet St
- Concepcion, Manuel S CE '14.....562 Legadra St Manila P I
Vice-President Philippine National Bank
- Condon, John Jr CE '08.....412 Kent Rd Cynwyd Pa
Mgr Br Off Turner Constr Co 1713 Sanson St Phila Pa
- Conger, Alger A CE '97 MASCE 13 St Elmo Road Worcester
Cons Engr New England Power Co 35 Harvard St [Mass]
- Conger, Hiram G CE '09.....Evanston Ill
Clergyman 906 Asbury Ave
- Conger, Jay Jr CE '16.....Groton N Y
With Groton Bridge Works
- Conger, Laurence J CE '07.....Groton N Y
President Corona Typewriter Co Inc and Airdry Corp
- Conger, Walter C CE '12.....Youngstown O
Sales Engr Truseon Steel Co
- Conklin, William E CE '00.....Fishkill N Y
Pres & Gen Mgr So Dutchess Gas & Elec Co and Fishkill Elec
Ry Co Beacon N Y
- Conkling, Frank E Jr CE '22 MCE '23 387 E Main St Patch-
Asst Engr Atlantic Fruit Co Cayo Mambi Cuba [ogue N Y]
- Conkling, Leon D CE '00 MASCE MSPEE 516 S Grand Ave
Prof & Head CE Dept Mont State Coll Bozeman Mont
- Conley, James CE '10.....233 S Albany St Ithaca N Y
Secy & Treas P D Conley Constr Co
- Connor, Frederick T CE '04.....133 Dempster St Evanston Ill
Sales Agt Buda Co 600 Ry Exch Bldg Chicago Ill
- Conover, G Elliot CE '21.....Asbury Park N J
Engrg Dept N Y Tel Co 15 Dey St New York City
- Constans, Frank S CE '19.....5427 Univ Ave Chicago Ill
Supt Chas H Law Pibg & Hig Co 4046 S State St
- Conway, Herbert H CE '11.....Maplewood N J
Engr & Contr 128 Market St Newark N J
- Conwell, Walter L CE '11.....969 E State St Ithaca N Y
Asst Prof Hwy Engrg School of Civil Engrg C U
- Cook, James R CE '20.....Chappaqua N Y
Civil Engr Hazen & Whipple 30 E 42nd St N Y C
- Coonan, Carl C CE '15.....AMASCE W Webster N Y
Engr C H Sage Contr Batavia N Y
- Coons, Paul D CE '05.....MAREA Riverside Ill
Asst Val Engr C B & Q R R Chicago Ill
- Cooper, James A Jr CE '16.....426 56th St Brooklyn N Y
Engrg Dept N Y Tel Co 15 Dey St New York City
- Cooper, William M Jr CE '21.....118 E Nineteenth St N Y C
Tech Investigator Western Elect Co 397 Hudson St
- Copeland, Dwight L CE '23.....W Bridgewater Mass
- Corbet, Clinton L CE '15.....5638 Blackstone Ave Chicago Ill
- Corbin, Horace CE '05.....236 Pelton Ave W Brighton N Y
Asst Engr Pier 6 E River New York City
- Cormaek, Charles M CE '20.....6 Stirling Ave Buffalo N Y
Real Estate & Insurance Broker 502 Erie Co Bank Bldg
- Cornell, W Rodney BS CE '15.....MSPEE 438 N Aurora St
Asst Prof in Applied Mech Sibley School [Ithaca N Y
of Mech Engr Cornell Univ]
- Cortina, Cesar CE '21.....San Pedro de Macoris Santo Domingo
- Corwin, Daniel C CE '08.....AMASCE Valley Stream N Y
- Cory, Harry T BEE BCE MCE '93 MME MASCE MASME
Cons Engr Title Ins Bldg Los Angeles Calif
- Cosgrove, Thomas Jr CE '09.....447 Second St Braddock Pa
- Courtney, John H CE '17.....218 Eddy St Ithaca N Y
Engr Geo A Fuller Co New Jefferson Standard Life Ins Bldg
Greensboro N C
- Covert, Pitt Jr CE '13.....375 C Y Ave Casper Wyo
Oil Refining S O Co
- Cowan, Lewis A BCE CE '05.....Blackmore Apts Bozeman
Engr Oil Development Northern Pacific Ry [Mont]
- Cownie, Donald L CE '17.....335 Baynes St Buffalo N Y
- Cox, Homer F CE '97.....MAWWA 430 Colfax Ave
Supt & Chief Engr Scranton Gas & Water Co Scranton Pa
- Cozzens, Arthur B CE '13.....MAICP MASMI 255 E 28th St
Dist Sales Mgr Phillips-Jones Corp [Brooklyn NY]
- Craig, Dan S BS CE '13.....1169 21st St Des Moines Ia
Sec-Treas Empire Contr Co 203 Flynn Bldg
- Craig, Joseph E BS CE '03.....AMASCE 1449 Third Ave
Cons Engr 1536 Post St Jacksonville Fla [Columbus Ga]
- Craighead, Samuel J CE '22.....729 Hill Ave Wilkensburg Pa
- Crاندall, Carl CE '12.....AMASCE 404 Univ Ave Ithaca N Y
Asst Prof Rwy Engrg School of Civil Engrg C U
- Crاندall, Lynn CE '10.....MASCE 316 Hector St Ithaca N Y
Water Commissioner for Big Lost River Mackay Idaho
- Crane, Albert S CE '91.....MASCE MBosSCE
V-P J G White Engrg Corp 43 Exchange Place N Y C
- Craue, Frederick W CE '19.....980 Hertel Ave Buffalo N Y
Design & Est Dept Lackawanna Bridge Co
- Crawford, William Jr CE '23.....729 Hattie St Schenectady N Y
- Critchlow, Howard T CE '10.....AMASCE 577 Rutherford Ave
Hydr Engr Dept of Conservation & Development State
House Trenton N J
- Crofts, Edgar R CE '10.....Hanover Conn
Purch Agent Roch Gas & Elec Corp Rochester N Y
- Crook, C Earl CE '16.....317 S Penn St Wheeling W Va
Structural Engineer J E Moss Iron Works
- Crosette, Murray F CE '02.....MAIME 337 S Franklin St
Min Engr Cia de Combustibles "Agujita" [Chicago Ill]
- Apt 34 Sabinas Coah Mex
- Crossman, Ralph S CE '11 AMASCE MIES Huntington N Y
Assoe Engrg Drawing Univ of Ill Urbana Ill
- Croun, Arthur W CE '23.....E Aurora N Y
Jun Asst Engr N Y State Hwy Comm Blodgett's Mills N Y
- Crouch, N Seymour CE '90.....127 W 11th St Erie Pa
- Crusel, Cornelius C CE '22.....1637 Constantinople St New
Engr S O Co of La Box 474 Homer La [Orleans La]
- Cubler, Edward C CE '22.....4917 A St Olney Philadelphia Pa
- Cudebee, Albert B CE '08.....MASCE Paris France
Cons Engr Canadian Porcelain Co Ltd 3 rue Taiboat
- Cuff, James E CE '12.....AMASCE MRoES Rochester N Y
Lawyer 25 Rochester Savings Bank Bldg
- Culbertson, William J CE '15.....211 Sheriff St Paris Ill
Constr Dept Holly Sugar Corp Boston Bldg Denver Colo
- Cummin, Gaylord C CE '04.....AMASCE MAWWA 31 Bellevue
Cons Engr Inst for Pub Service 1125 [Ave Dayton O]
- Amsterdam Ave New York City
- Cummin, Hart CE '09.....AMASCE El Paso Tex
Mun Research Engr e/o Chamber of Comm
- Cummings, Edward CE '17.....2877 Briggs Ave N Y C
Ward Motor Vehicle Co Mount Vernon N Y
- Cummings, Elmore D CE '80.....MASCE 4608 15th St N W
U S Asst Engr Off Chf of Engrs 20th & B Sts [Wash D C]
- Cummings, Noah CE '94.....AMASCE 457 Dunham Ave Mt
Asst Engr Dept Plant and Strs [Vernon N Y]
- Mun Bldg N Y C
- Curry, Albert CE '02.....Woodland Road Pittsburgh Pa
Real Estate 1507 First National Bank Bldg
- Curry, Lynn B CE '13.....MAAE MESPa 918 Green St
Civil Engr with Gannett Seelye & Fleming Harrisburg Pa
- Curtis, Charles E CE '85.....MASCE 111 Quarry St Ithaca N Y
Supt Bldgs and Grounds Cornell Univ
- Curtis, Charles W CE '88 LLB..17 Melrose St Rochester N Y
Statistician Sill Stove Works 524 Oak St
- Curtis, George D BS CE '09.....1804 Jetton Ave Tampa Fla
Cashier The Morris Plan Bank Co 310 Cass St
- Curtis, Gram CE '72.....323 N Jefferson St New Castle Pa
Mech Engr & Desnr New Castle Works Carnegie Steel Co
- Curtiss, R Elmer CE '04.....41 Sumner St Hartford Conn
Contr and Civil Engr 721 Main St
- Custer, Lewis B CE '07.....57 North St Mt Vernon N Y
Bond Salesman Guaranty Co 140 Broadway N Y C
- da Costa, Oscar M CE '16.....Bauru Sao Paulo Brazil
Engr M of W N W Brazil Rwy
- Daddysman, Reginald A CE '22 1121 E Main St Medford Ore
Engr Steelform Contrg Co San Francisco Calif
- Dahmen, Ernest A CE '06.....MAAE 113 Ferris Place
Co Asst Engr N Y State Hwy Comm [Ithaca N Y]

- Dailey, Bernard C CE '17----600 W 192d St New York City
First Lieut C A C U S A Fort Rosecrans Calif
- Daley, DeWitt H CE '06-----Chatham N Y
Engineer N Y State Hwy Comm Albany N Y
- Dalton, Douglas A CE '14-----Riverside Conn
- Daly, John W CE '12-----AMASCE 238 Mayflower Ave New
Asst Engr Transit Constr Comm Bklyn N Y [Rochelle N Y
- Daly, Walter P CE '16-----612 Washington St Olean N Y
Engineer 1217 Otis Bldg Philadelphia Pa
- Danforth, Thomas F CE '15--364 Norwood Ave Buffalo N Y
John W. Danforth Co 70-72 Ellicott Sq
- Daniels, Francis W CE '21-----Gilbertsville N Y
With Contractor 227 Rockwell St Norwich Conn
- Daniels, Percy N CE '15-----602 Stuyvesant Ave Trenton N J
San Engr N J State Dept of Health
- Danis, Benjamin G CE '09-----930 Chester Ave Dayton O
Pres Danis-Hunt Constr Co Contrs 908 Schwind Bldg
- Dann, Alexander W CE '07-----AMASCE Pittsburgh Pa
Vice-Pres & Treas Keystone Sand & Supply Co
- Darrow, Henry D CE '07-----153 Pearl St Kingston N Y
City Engineer
- Darrow, Marius S CE '99-----AMASCE Kingston N Y
Mgr Barber Asphalt Paving Co Madison Ill
- Darrow, Warren E CE '07--120 Albany Ave Takoma Park D C
Jun Civil Engr U S Engrs Off Washington D C
- Darrow, Wilton J CE '99-----MASCE Lakewood N Y
Civil Engineer Oceanside Calif
- Darville, Merton A CE '12-----162 25th St Ehlhurst N Y
Off Mgr Turner Constr Co 244 Madison Ave N Y C
- Daudt, Ralph B AB '07 CE '10--AMASCE MTSE Toledo O
Chief Engr A Bentley & Sons Co 13th & Belmont Sts
- Davenport, Ward P CE '93-----46 Church St Plymouth Pa
Supt Spring Brook Water Supply Co 114 W Main St
- Davidson, Clarence H CE '11-----2 Mt Pleasant Amherst Mass
- Davis, Carl E CE '91-----MMemEC R F D No 5 Buntyn Tenn
Resident Engineer Memphis Water Dept Memphis Tenn
- Davis, Charles S CE '89-----MAREA MASCE 306 Broad St
Cons Engr 802 Century Bldg Pittsburgh Pa [Sewickley Pa
- Davis, Donald G CE '17-----8 Noyes St Utica N Y
Mem Firm & Genl Supt Municipal Construction Co
- Davis, E. Russell CE '13-----MASMI Westover Apts
City Engineer City Hall Newport News Va
- Davis, George J Jr CE '02-----MASCE Pinchurst Tuscaloosa
Dean & Prof Civil Engrg Univ of Ala University Ala [Ala
- Davis, John C CE '00-----AMASCE 486 Stratford Court
Staff Engr Citizen's Bur 425 Water St [Shorewood Wis
- Davis, Le Roy M CE '23-----32 Univ Ave Buffalo N Y
Asst Engr N F Hyd Pow & Mfg Co Niagara Falls N Y
- Davis, Lynn L CE '96-----MASCE 32 Univ Ave Buffalo N Y
Prin Asst Engr U S Army Engrs Off 540 Federal Bldg
- Davis, Meyer CE '08-----MASCE 152 W 118 St N Y C
Asst Mgr Sales H H Robertson Co Pittsburgh Pa
- Davis, Robt M CE '07--MNELA 34 Wyoming Ave Hollis NY
Statistical Editor *Electrical World* New York City
- Davis, Roland P SB MCE '08 PhD '14-----MAREA MASCE
Prof Str & Hyd Engr W Va Univ & [Morgantown W Va
Cons Br Engr W Va State Rd Comm
- Dawson, Francis M BS in CE MCE '13-----AMEIC MASTM
Assoe Prof Hydr Engrg Univ of [Truro Nova Scotia
Kansas Lawrence Kans
- Day, Harold CE '20-----2750 Maryland Ave Baltimore Md
Bridge Draftsman B & O R R
- Day, Warren E CE '10-----Oakdale Stanislaus Co Calif
Genl Supt Phoenix Utility Co Sanford N C
- Deagon, Arthur CE '21-----37 Lincoln St Denver Colo
Linde Air Products Co 695 S Broadway
- Dean, George W BS CE '04-----28 Sycamore St Windsor Conn
- de Barros, Carlos Paes CE '76-----Sao Paulo Brazil
Coffee Planter & Pres Textile Co Rua Sta Efigenia No 20
- DeCarre, Octave CE '11--e/o Adj Genl U S A Washington D C
Major U S A C A C Fort Monroe Va
- Decker, A Clinton CE '09 MAPHA [MAWA Prince Bay N Y
San Engr 668 Ridgeway Rd Fairfield Ala
- de Clerq, Clarence F CE '07-----MAAE 5 Hotchkiss St
Asst Engr N Y State Hwy Comm Binghamton N Y
- Degling, Albert O CE '20-----95 N 15th St E Orange N J
Asst Engr Turner Constr Co of N Y Peters Bldg Williams-
port Pa
- DeGolyer, Calvin S CE '10-----Table Rock Farm Castile N Y
Farmer
- Dehuff, Wilmer A CE '10-----203 E 32d St Baltimore Md
Principal Baltimore Polytechnic Institute
- DeLano, Harry C CE '95-----MASCE Canastota N Y
- DeLaney, Francis M CE '22-----704 Fifth St Watervliet N Y
e/o N Y Telephone Co 15 Dey St N Y C
- Demarest, John McL CE '14-----584 W 152d St N Y C
e/o W E Truesdell Ind Engr 5 Beekman St
- Dennett, Robert C CE '04--AMASCE 76 S Grove St Freeport
[N Y
Off Engr Natl Bd Fire Underwriters 76 William St N Y C
- Dennis, Harry W CE '99-----MASCE 871 N Kenmore Ave
Constr Engr Southern Calif Edison Co Los Angeles Calif
- Dennis, Olive W CE '20-----1021 Madison Ave Baltimore Md
Engineer of Service B & O R R
- Denniston, Jesse H CE '09-----Cornwall-on-Hudson N Y
- de Porrata-Doria, Francisco L CE '13-----35 Marina St
Civil Engr & Bldr 3 Mayo St Ponce P R
- Devin, George CE '73-----MASCE Los Angeles Calif
- DeWitt, John CE '17-----Broadmore Colorado Springs Colo
- Diamant, Albert CE '09-----AMASCE 65 Van Buren St
[Brooklyn N Y
Supt Lincoln Engrg Corp Maspeth Ave & Scott St
- Dickens, Wayland CE '09-----165 State St Brooklyn N Y
- Dickinson, J Haines CE '90-----Montclair N J
Manager & Chief Engineer Logging Dept Lidgerwood Mfg
Co 96 Liberty St N Y C
- Dickinson, William E CE '14-----Salt Lake City Utah
313 Federal Bldg
- Diefendorf, Charles W CE '08-----MAAE Syracuse N Y
Highway Engineer 120 W Jefferson St
- Diehl, Edward P CE '23 Beach 38th St Seagate Brooklyn N Y
- Dillard, William R CE '17-----302 E Main St Washington Ga
Engr Converse Bridge & Steel Co Chattanooga Tenn
- Dillenbeck, Arvin J CE '11--AMASCE 50 Wellington Road
Mem of Firm Edward P Lupfer Corp 594 Ellicott Sq Buf-
falo N Y
- Dillenbeck, Clark CE '88--MASCE MECIPH 209 Pelham Rd
Asst Chief Engr P & R Ry Co 522 [Germantown Pa
Reading Term Philadelphia Pa
- Dimjian, Aran H CE '18-----1108 S 13th St Birmingham Ala
Civil Engineer State of Alabama
- Dimon, Daniel Y CE '96--MASCE R F D 243 Riverhead N Y
- Dingle, James H BA CE '92-----MASCE 182 Tradd St
City Engineer Charleston S C
- Dinnerstein, Nathan CE '17 1911a Atlantic Ave Brooklyn N Y
- Distler, Walter G CE '13-----2905 N Calvert St Baltimore Md
Vice-Pres Geo A Fuller Co Munsey Bldg Washington D C
- Dittmar, Albert L CE '19-----916 Erie Ave Williamsport Pa
State Hwy Inspector 29 Queens St Wellsboro Pa
- Dittrich, John A CE '14-----2555 Grand Concourse N Y C
Sales Engineer Blaw-Knox Co 165 Broadway
- Dixon, DeForest H CE '96-----AMASCE 204 W 86th St
Vice-Pres Turner Constr Co 244 Madison Ave N Y C
- Dockstader, Simeon E CE '10-----N Tonawanda N Y
Superintendent Engineer American District Steam Co
- Dodge, J Lynn CE '94-----MAAE MASCE 253 Lake Ave Pit-
Plant Engr U S Shipping Board Hog Island Pa [man N J
- Dodgson, Frank L CE '89-----MAREA Rochester N Y
Consulting Engineer General Railway Signal Co
- Dodson, Richard S BS CE '08-----Norfolk Va
Major C A C U S A Fort Monroe Va
- Doebler, Errol W CE '15-----AMASCE Box 611 Sea Cliff N Y
Instr Civil Engrg Swarthmore Coll Swarthmore Pa
- Dole, Walter S CE '92 MAGI 187 Arlington Ave Riverside
Gas Engr Fed Lt & Trac Co 52 William St N Y C [Calif
- Dominguez, Rafael CE '04--MASCE Rio de Janeiro Brazil
e/o AngloMex Petroleum Co Ltd 41 Ave Rio Branco
- Donnellan, George P CE '10-----32 Peachtree Way Atlanta Ga
Estimating Engineer A J Krebs Co
- Doeres, William R CE '93-----MNGS
Col U S A Coast Art Fort Adams R I
- Dornbach, Earle E R CE '15-----56 Phelps St Lyons N Y
- Dorsey, John G CE '16-----Selwood Bldg Duluth Minn
- Dougherty, Nathan W BS in CE CE '13 MCE '14 MAAE
Head Professor Civil Engrg [MASCE MSPEE MAAAS
Univ of Tenn Knoxville Tenn
- Douglas, Damon G CE '21-----58 E 96th St New York City
Asst Supt Turner Constr Co of N Y C San Juan Hotel
Orlando Fla
- Douglas, P Gordon CE '06-----Hamadan Persia
Imperial Bank of Persia
- Dow, Ezekiah S CE '15-----312 Lee St Evanston Ill
Field Engr Chicago Union Station Co Chicago Ill
- Dowling, Joseph L CE '89-----217 Sul Ross Ave Houston Tex
Vice-President The Texas Pipeline Co
- Downey, Archibald S CE '96-----MASCE MPNWSE
Engineer & Contractor 311 Hoge Bldg Seattle Wash
- Downs, Ernest W CE '23-----19 Orchard St Danbury Conn
- Doyle, Robert E CE '12-----900 W Franklin St Richmond Va
- Drake, Archibald E CE '07--140 Lexington Ave Cambridge
Asst Mgr Travelers Ins Co 141 Milk St Boston Mass [Mass
- Dransfeld, Thomas Jr AB CE '10 12 Russell St Malden Mass
Str Engr Stone & Webster Inc 147 Milk St Boston Mass
- Drennen, Everett CE '08 MAIME MNatCoalA MRRCI of
President W Va Coal & Coke Co Elkins W Va [N Y

- Driscoll, James F *CE* '17-----105 College Ave Ithaca N Y
United Engrg Co 1950 E 90th St Cleveland O
- Duba, John Jr *CE* '15---MAAE 17 Stratford Apts Norfolk Va
C E Aide Public Works Off Navy Yd
- Dubuis, John B *CE* '09-----AMASCE Bend Ore
Dubuis & Redfield Consulting Engineers
- Ducasse, Vidal *CE* '20-----8 Carlos III Havana Cuba
- Duckham, Albert E *CE* '90-----MESWI Pa 246 S Rebecca St
Cons Civil Engr 64 Vandergrift Bldg Pittsburgh Pa
- Dudley, Harold J *CE* '22-----15 Park Pl Silver Creek N Y
- Duffies, Edward J *CE* '88---MAAE MASCE Washington D C
U S Asst Engr Off Chief of Engrs War Dept
- Duffies, Edward L *CE* '21---2412 12th St N E Washington D C
Estimator Concrete Steel Co 1015 Woodward Bldg
- Duneau, Danl T *CE* '18---320 W Cambridge St Greenwood S C
- Dunham, Walter H *CE* '94-----187 Maryland St Buffalo N Y
Chief Engr C F Ernst Sons Iron Works 75 Lathrop St
- Dunlap, Arthur H *BS of CE CE* '99---AMASCE Barstow Tex
Member State Board of Water Engrs Austin Tex
- Dunn, Albert C *CE* '14-----AMASCE MAAE Richmond Va
Highway Engineer Bur Pub Roads Box 415
- Dunn, Frank S *CE* '92-----MAGASA MSEENY Albany N Y
Supt Gas Dept Mun Gas Co 126 State St
- DuPré, Wallace D *AB AM CE* '13-----233 N Church St
Manager Ford Agency Spartansburg S C
- Durkan, William J *CE* '06 158 Flower Ave E Watertown N Y
- Duryea, Edwin Jr *CE* '83---MASCE 318 Lincoln Ave Palo Alto
Civil & Cons Engr 1318 Humboldt Bank [Calif
Bldg San Francisco Calif
- Duschak, Ernest A *CE* '06---231 Durand St Sarnia Ont Can
Engineering Department Imperial Oil Co
- Dyson, James *CE* '78---MAIME 1437 Reese St Silverton Colo
Civil and Mining Engineer U S Mineral Surveyor
- Eager, Norman A *BS MCE* '23-----4628 St Catherine St
[Westmount P Q Can
Consulting Engineer
- Earl, Mark A *BS MCE* '94-----Muskogee Okla
- Eddy, Allerton *CE* '21-----Canaan Conn
- Edge, Alfred J *CE* '06-----c/o W S Edge Westfield N J
Asst Mgr U S Rubber Pltn Medan Sumatra D E I
- Edge, Walter S *CE* '03---MACI 122 N Euclid Ave Westfield
Chief Engr Concrete Steel Co 42 Broadway N Y C [N J
- Edmunds, Robert C *CE* '18---617 E 16th Ave Denver Colo
Goodyear Rubber Co Akron O
- Edwards, Elmer G *CE* '12---3341 Bryant Ave S Minneapolis
Hwy Engr U S Bur Pub Rds 410 Hamm Bldg [Minn
St Paul Minn
- Edwards, James H *CE* '88---MASCE 130 Lafayette Ave
[Passaic N J
Asst Chief Engr Amer Bridge Co 71 Broadway N Y C
- Edwards, Latta V *BE CE* '11-----AMASCE MAAE
Cons Engr Box 60 Winston-Salem N C
- Edwards, Llewellyn H *CE* '15---432 Grand St Susquehanna Pa
Maintenance Inspector Erie RR
- Edwards, Robert F *CE* '17---MAAE MChEC---Chatham N J
Civil Engr Southern Power Co Charlotte N C
- Egbert, J Byron *CE* '07---MAAE 363 Smith St Peekskill N Y
County Asst Westchester Co N Y State Hwy Comm
- Egeberg Hans O *CE* '00-----712 Jackson St Gary Ind
Supt Labor Illinois Steel Co Gary Works
- Ehle, Boyd *CE* '86-----MASCE East Creek N Y
Chief Engr Susquehanna Pow Co Conowingo Md
- Ehlers, Joseph H *MCE* '16---151 Seymour St Hartford Conn
Prof Str Engrg Pei Yang Univ Tientsin China
- Ehlers, Victor M *BS CE* '10 MTWWA MAPHA La Grange
State San Engr Capitol Station Austin Tex [Tex
- Ehrlich, Arthur C *CE* '14---15 W 107th St New York City
Chief Engr Amer Tobacco Co 111 Fifth Ave
- Eickelberg, Ernest W *CE* '13---AMASCE 1215 Parkwood Dr
Hydro and Geod Engr USC&GS [Cleveland O
Washington D C
- Eidlitz, Otto M *CE* '81---MASCE MASTM 787 Fifth Ave
Pres Marc Eidlitz & Son 41 E 42d St N Y C
- Eilenberger, Charles F *CE* '16 58 Grand Ave Middletown N Y
Asst Field Engr H Koppers Co c/o Bethlehem Steel Co
Buffalo N Y
- Eisenbrandt, Alexander S *CE* '20-----2510 Roslyn Ave
Wholesaler of Victor Products 417 Howard St [Baltimore Md
- Eisenbrandt, Frederick H *CE* '18-----Ridge Rd
Assistant Engineer Dept of Sewers Baltimore Md
- Eisner, Benjamin *CE* '20-----700 S Broad St Trenton N J
- Elkan, Stanley A *CE* '23---300 Katherine Court Macon Ga
Engr Off Cent of Ga Rwy Savannah Ga
- Elkind, Isadore J *CE* '13---84 Elliott Ave Yonkers N Y
Asst Manger S Blickman 199 Lafayette St N Y C
- Elliott, John E *AB CE* '05---MECIT 1530 Riverside Ave
Plant Engr Trenton Plant Am Bridge Co Trenton N J
- Ellis, Albert R *CE* '05---6339 Marchand St Pittsburgh Pa
Genl Mgr Pittsburgh Testing Laboratories
- Ellis, Douglas S *MCE* '20---209 Albert St Kingston Ont Can
Prof of Civil Engrg Queens University
- Ellis, Guernsey W *CE* '04---MAAE 3 Olive Pl Hornell N Y
Asst Engr N Y State Hwy Comm
- Ellis, Lawrence R *CE* '04---5230 21st St NE Seattle Wash
Secretary Ellis-Myroie Lumber Co
- Ellsworth, Goodwin D Jr *CE* '10---1248 Girard St NW Wash
G D Ellsworth Co Contrg Engrs 412 U S Nat Bank [D C
Bldg Portland Ore
- Elting, Oscar R *CE* '14-----AMASCE New Paltz N Y
Asst Engr Bur of Water Supply Akron O
- Elton, Richard L *CE* '12---AMASCE 5646 Rockhill Ave Kansas
Mgr Richs Material Supply Co 815 Republic Bldg [City Mo
- Elwood, Frank E *CE* '06---227 E Broadway Glendale Calif
- Ely, G Wells *CE MCE* '11---39 Charles St New York City
- Emmert, Luther D *CE* '11---1704 Hinman Ave Evanston Ill
Repr Buffalo Forge Co 562 W Washington Blvd Chicago Ill
- Engel, Arthur W *CE* '09---333 Thorn St Sewickley Pa
Str Designer Am Br Co 1420 Frick Bldg Pittsburgh Pa
- Engel, Joseph S *CE* '20---591 Logan St Brooklyn N Y
- Engel, Francis J *CE* '10---2000 32d Ave S Seattle Wash
Asst Civil Engr Great Northern Rwy
- Eppler, Charles Jr *CE* '16---963 Grant Ave N Y C
Salesman Export Dept Bethlehem Steel Export Corp 25 Bwy
- Erickson, Charles E *CE* '10---1616 East Howell St
Contrg & Lumber 317 Hoge Bldg Annex Seattle Wash
- Erisman, Henry L *CE* '92-----St Louis Mo
R of W Appraiser St L & S F Ry Co 631 Frisco Bldg
- Etnyre, Samuel L *CE* '88---MIAES MAWA 303 2nd St
Superintendent Water Works Co Council Bluffs Ia
- Evans, Edward A *CE* '06---511 W 143d St New York City
Res Engr Catawba Mfg & Elec Pow Co Mount Holly NC
- Evans, Thomas B *CE* '22-----Church View Va
- Evans, William H *CE* '22---415 Turin St Rome N Y
- Evans, William H *CE* '15---2117 Pine St New Orleans La
Civil Engr Standard Oil Co of La 1206 Whitney Cent Bldg
- Eyrich, Harold R *CE* '14---33 Bellvue Pl Chicago Ill
- Fahey, Aloysius A *CE* '14-----Eastport Me
- Fahy, Charles H *CE* '17---21 Arnold Park Rochester N Y
- Fairbank, Herbert S *CE* '10---2041 E 32d St Baltimore Md
Sen Hwy Engr Bur Pub Roads Dept of Agr Wash D C
- Faneher, Archie J *CE* '11---91 Peterson Pl Lynbrook N Y
Tel Engr N Y Tel Co 81 Willoughby St Brooklyn N Y
- Fang, I-Pu *CE* '23-----c/o Tsing Hua Coll Peking China
- Farlin, Charles D *CE* '13---168 Drake Ave W New Brighton
Engineer 200 Edgewater St Rosebank N Y [N Y
- Farmer, William F *CE* '76---126 Amherst St Nashua N H
Retired
- Farr, Newton C *CE* '09---4737 Woodlawn Ave Chicago Ill
Real Estate 140 S Dearborn St
- Farrington, William S *CE* '88---359 Norwood Ave Buffalo N Y
Pres & Treas Genl Flour & Feed Co Chamber of Comm
- Fassett, Newton C *CE* '04---150 Lake St Elmira N Y
Elmira Rep Hemphill Noyes & Co of N Y C
- Faucher, Cyril A *CE* '10---310 Franklin St Rochester N Y
Supt of Constr Turner Constr Co 244 Madison Ave N Y C
- Faustman, William F *CE* '07---MAAE 423 22d St Sacra-
Asst Engr Calif State Hwy Comm [mento Calif
- Fay, Alfred L *CE* '20---192 Cedar St Wauwatosa Wis
With Hool Johnson & Whitney Cons Engrs 445 Milwaukee St
Milwaukee Wis
- Fay, Arthur T *CE* '12---Cooperstown N Y
Asst Constr Engr Semet-Solvay Co Buffalo N Y
- Fear, Holbert W *CE* '13---MBosSCE 31 Chestnut St
Mem Firm Fear & White Glove Mfrs [Gloversville N Y
- Feehan, Harry J *CE* '14---807 E State St Ithaca N Y
Truscon Steel Co 58 Lafayette Blvd Detroit Mich
- Fein, Paul *CE* '17---1014 Eastern Pky Brooklyn N Y
- Feiner, Mark A *CE* '13---3143 Broadway New York City
With P Feiner 505-7 W 45th St
- Feinson, Samuel H *CE* '22---295 Throop Ave Brooklyn N Y
- Feldman, Louis *CE* '16---1451 Second Ave N Y C
- Felknor, James M *AB CE* '09---R D No 3 Morristown Tenn
Engr in Charge Hwy Constr Colusa Co Colusa Calif
- Fellman, Morris *CE* '09---50 W 54th St New York City
Designer & Engineer S M I Engrg Co 15 E 40th St
- Ferguson, George A *CE* '01---628 Eleventh Ave N Seattle
Mem Firm Ferguson Constr Co 517 3d Ave N [Wash
- Forguson, Oscar W *CE* '75---New Milford N Y
- Fernandez, Francisco J *CE* '17---Box 518 Cienfuegos Cuba
Civil Engr Central Jarona Camaguey Cuba
- Fernow, Ross R *CE* '02---Philadelphia Pa
Cons Engr 1524 Chestnut St
- Ferrer, Francisco J *CE* '17---Concejal Veiga 18 Vibora
[Havana Cuba

- Ferris, George F *CE* '81-----Sierra Madre Calif
 Ferris, Ralph J *CE* '07-----Linesville Pa
 Engr in Chg Pymatuning Reservoir Project
- Fertel, Arthur *CE* '21-----303 Hooper St Brooklyn N Y
 Asst Engr Raymond Cone Pile Co 420 34th St Norfolk Va
 Field, Arthur M *CE* '14-----AMASCE 61 Nunda Blvd
 Hopkins & Field Cons Engrs 349 Cutler Bldg Rochester N Y
 Fields, Frank V *CE* '18-----AMASCE 21 Serrell Ave
 Binghamton N Y
- Res Engr Fla State Road Dept Callahan Fla
- Filby, Ellsworth L *CE* '17-----MAPHA 1319 Bull St
 State San Engr State Board of Health Columbia S C
- Filkins, Claude W L *CE* '93 *MCE* '94-----MAAE 1701 Madison
 Civil Engr 725 Comm Trust Bldg [Ave Scranton Pa
 Philadelphia Pa
- Finch, Burlis J *CE* '07-----MAAE 2553 Van Buren Ave
 Dist Engr U S Bur of Public Roads [Ogden Utah
- Finch, Jerry C *CE* '02-----827 Lancaster St Albany N Y
 Finch & Benton Lake George Real Estate
- Finkelburg, Elliot A *CE* '15-----R D 1 Missoula Mont
 Chief Hydrographer Minidoka Irr Dist Rupert Ida
- Finkelstein, Nathan R *BS CE* '11-----157 W 79th St N Y C
 Secy & Treas Sam Finkelstein & Co Inc 801 Broadway
- Finley, George I *CE* '00-----104 E End Ave Pittsburgh Pa
 Civil Engr 806 Phipps Power Bldg
- Firth, Elmer W *CE* '95 *AM PhD*-----AMASCE 1 John St
 Asst Engr in charge Maint Bur Sewers [Jamaica N Y
 Bor of Queens New York City
- Fischer, Nemo M *CE* '12-----21st St Flushing N Y
 Sales Mgr Joseph F Haas Motors Inc 1537 Bedford Ave
 [Brooklyn N Y
- Fish, John C L *CE* '98-----MASCE MAREA MSPEE
 Prof Railroad Engrg Stanford Univ Palo Alto Calif
- Fisher, Clarence F *CE* '09-----3327 Clarendon Rd Cleveland Hts
 5716 Euclid Ave Cleveland O [O
- Fisher, Frederick W *CE* '03-----MASCE MRES Fairport N Y
 Adjuster Emp & Safety Mgr Roch Gas & Eleet Corp
 34 Clinton Ave N Rochester N Y
- Fisher, Harold S *CE* '20-----85 Whitney Pl Buffalo N Y
 Teacher Mech Drawing Buff Tech High School
- Fisher, John E *CE* '18-----308 W Seneca St Ithaca N Y
 e/o Wells & Newton Ave Bat 17th St N Y C
- Fisher, Wager *CE* '99-----AMASCE Bryn Mawr Pa
 Cons Engr 205 Otis Bldg Philadelphia Pa
- Fitch, Charles W *CE* '10-----Lyon Park Clarendon Va
 Fitch, Squire E *CE* '00-----42 Academy St Westfield N Y
 County Engr Chautauqua Co Jamestown N Y
- Fitzgerald, James W *CE* '18-----James St Clayton N Y
 Cashier National Exchange Bank
- Fitzgerald, John M *CE* '09-----MARB&BA Fillmore N Y
 Roadmaster Cent of Ga Ry Room 209 Term Sta Macon Ga
- Fitzpatrick, Frank T *CE* '15-----432 W 51st St N Y C
 Fitzpatrick, Paul E *CE* '21-----44 Seminole Pky Buffalo N Y
 Pres W H Fitzpatrick & Sons Inc Gen Contrs 1920 Seneca St
- Fitz-Randolph, W S *CE* '05-----Sloatsburg, N Y
 Bldr & Contr 1328 Broadway New York City
- Flanigan, Horace C *CE* '12-----Quaker Ridge New Rochelle N Y
 116 E 53d St New York City
- Fleming, Thomas Jr *BS CE* '05-----MASCE 5225 Pembroke Pl
 c/o Oil Well Supply Co 215 Water St Pittsburgh Pa
- Fleming, Thomas J *CE* '13-----29 Beacon St Waterbury Conn
 General Contractor P O Box 222
- Flynn, Walter F J *CE* '12-----151 W 42d St New York City
- Foard, Arthur V *CE* '06-----1602 Linden Ave Baltimore Md
 Asst Supt Md Dredging & Contracting Co
- Follansbee, Robert *CE* '02-----MASCE Denver Colo
 Dist Engr U S G S 403 New P O Bldg
- Foote, Benjamin F *AB* '13 *CE* '16 1169 South Ave Wilkins-
 Salesman 616 Pittsburgh Life Bldg Pittsburgh Pa [burg Pa
- Ford, Robert G *CE* '07-----Bellwood Pa
 Supervisor Penn R R Lock Haven Pa
- Forrest, George M *BS CE* '02 MASME MAIME Ravenswood
 [Phillipsburg N J
 Gen Supt Ingersoll-Rand Co & A S Cameron Pump Works
- Forster, Clarence E *CE* '15-----558 Crescent Ave Buffalo N Y
 Asst Engr Natl Aniline & Chem Co
- Fort, Edwin J *CE MCE* '94-----MASCE MASTM MASMI
 City Manager Niagara Falls N Y
- Fortier, Ernest C *CE* '18-----615 E Walnut St Pasadena Calif
 Res Engr State Land Board Delhi Calif
- Foster, Frank G *CE* '10-----54 Sunnyside Ave Pleasantville N Y
 Engr Fred T Ley & Co Inc 19 W 44th St N Y C
- Foster, Henry A *BS CE* '16-----AMASCE 205 Garfield Place
 [S Orange N J
 Str Designer Dwight P Robinson & Co 125 E 46th St N Y C
- Foster, Thomas M *CE* '04-----5659 Rosemary Pl
 Asst Secy La Fire Prev Bur 1309 7th St New Orleans La
- Foster, Willard S *CE* '19-----JASCE 161 Ridge Road Ruther-
 [ford N J
- Fountain, Thomas L *BS in CE CE* '05 MASCE College Sta Tex
 Prin Asst Engr Trammel & Holway 329 Kennedy Bldg Tulsa
 Okla
- Fowler, Charles H *CE* '14-----Little Falls N Y
 Contr Engr Truscon Steel Co Pittsburgh Pa
- Fowler, George *CE* '14-----9 Duryea Pl Hempstead N Y
 Organist & Choirmaster St Chrysostom's Chapel Trinity
 Parish 550 Seventh Ave New York City
- Fox, A Manuel *CE* '11-----MASS 431 Van Cortlandt Park Ave
 Asst Economist Tariff Beard Washington D C [Yonkers NY
- Fox, Charles J *CE* '11-----Ellicottville N Y
- Fox, Robert L *CE* '09-----AMASCE 126 State St Batavia N Y
 City Engineer Bethlehem Pa
- Frank, Alfred *CE* '98-----Alta Club Salt Lake City Utah
 Pres & Genl Mgr of Various Mining Cos 626 Newhouse Bldg
- Frank, George S *CE* '11-----AMASCE Laurel Hill N Y
 Mgr of Purchases Cornell Univ Ithaca N Y
- Frank, Harry H *CE* '12 AMASCE 753 Mellon St Pittsburgh Pa
 Supt of Constr The Hunting-Davis Co
- Frank, Leslie C *CE* '13-----AMASCE MACHS
 With U S Pub Health Serv 519 Dexter Ave Montgomery Ala
- Fraser, Edwin A *CE* '10-----607 Rugby Rd Brooklyn N Y
 Sales Engr 105 W 40th St N Y C
- Freeman, Herman M *CE* '93-----AMASCE 14 Northfield Ave
 Freeman & Winston Cons Engrs W Orange N J
- Freeman, William B *BCE CE* '05-----AMASCE 160 Franklin
 [St Denver Colo
 Cons Engr & Br Mgr Lock Joint Pipe Co 311 Engrs Bldg
- French, James B *CE* '85-----MASCE 75 Alsop St Jamaica N Y
 Consulting Engineer 50 Church St New York City
- Freyre, Leopold E *AB CE* '10-----MCUSE 12th St Vedado
 Civil Engr Central Ciguaga Camaguey Cuba [Havana C
- Fried, Isador *CE* '10-----
- Friedenberg, Benjamin *CE* '17-----JASCE 86 Amboy St Brook-
 Hydro & Geod Engr USC&GS Washington D C [lyn N Y
- Friese, Edwin *CE* '09-----Catonsville Md
 Res Engr State Rd Comm 601 Garrett Bldg Baltimore Md
- Fritz, Edward Jr *CE* '20-----254 Main St Poughkeepsie N Y
 Desng Engr Truscon Steel Co 31 Union Sq N Y C
- Fritz, William H Jr *CE* '16-----Berwyn Pa
 Lumber Business 1420 Chestnut St Philadelphia Pa
- Frosch, Albert E *CE* '09-----134 Stamm Ave Pittsburgh Pa
 Mgr Ohio River Gravel Co Wheeling W Va
- Frost, Charles P *CE* '16 16 Hammersly Ave Poughkeepsie NY
 With E V Anderson Genl Contr
- Proto, Antonio E de M *CE* '77-----Ceara Brazil
 Professor of Mathematics
- Fruchtbaum, Jacob *CE* '17-----783 Irving Ave Syracuse N Y
 Sales Engr Truscon Steel Co 440 Gurney Bldg
- Fuchs, Abraham W *CE* '13-----520 Jerome St Brooklyn N Y
 San Engr U S Pub Health Service Memphis Tenn
- Fuchs, John J *CE* '17-----334 E 17th St New York City
 Sales Engineer Cham of Comm Bldg New Haven Conn
- Fuertes, James H *CE* '81 MAICE MASCE MEIC MAWWA
 Hydr & San Engr 140 Nassau St N Y C
- Fuller, Almon H *MCE* '98-----MASCE MASTM MSPEE
 Prof Civil Engrg Iowa State Coll Ames Ia
- Fuller, Avery E *CE* '22-----Holley N Y
- Fuller, Weston E *CE* '00-----MASCE MNEWWA
 Prof Civil Engrg Swarthmore College Swarthmore Pa
- Fulton, Daniel F *CE* '03-----33 Morsemere Pl Yonkers N Y
- Fulton, William J *CE* '12-----c/o R E Taylor Fortuna N D
- Gaffin, William W *CE* '96-----MWSE Fond du Lac Wis
 Contractor
- Gage, Lloyd G *CE* '02-----1204 W Woolman St Butte Mont
 Mining Engr Anaconda Copper Mining Co
- Gallagher, Joseph *CE* '07-----4119 Westminster Pl St Louis Mo
 Asst Engr M & O R R 1201 Fullerton Bldg
- Gantz, Maurice A *CE* '13-----R D 2 Troy O
 City Engineer
- Garbi, Louis *CE* '07-----AEIC 5-Linecoln Ave Montreal PQ Can
 Gen Mgr Scottish Can Magnesite Co Ltd 705 McGill Bldg
- Garfinkel, Harry *CE* '22-----JASCE 836 Myrtle Ave Brooklyn NY
 With Berlin Constr Co New Britain Conn
- Garnezy, Samuel *CE* '13-----AMASCE 1382 Prospect Ave NYC
 Chief Desng Engr Atl Gulf & Pac Co Manila P I
- Garrabrant, Robert B *CE* '22-----998 Broad St Bloomfield N J
 Asst Engr Susquehanna Power Co Conowingo Md
- Garrett, Robert P *CE* '97-----MASCE NECSTL MASME
 Vice-Pres & Treas Mo Br & Iron Co 1000 Fullerton Bldg
 St Louis Mo
- Garrett, Seymour S *CE* '04-----115 Oak Hill Rd Ithaca N Y
 Prof Mechs Sibley School of M E Cornell Univ
- Garride, José *CE* '14-----55 Alejandro VI Manila P I
 Supt Building Construction & Inspection City Hall
- Gastmeyer, Robert W *CE* '11-----58 Berwyn St Orange N J
 c/o H L Doherty & Co 60 Wall St N Y C

- Gatslick, Samuel L CE '11--308 Huguenot Ave New Rochelle [N Y
Gavett, Weston CE '11 MCE '12-----MAWWA MNEWWA
With Clyde Potts 30 Church St N Y C [Plainfield N J
Gebhard, John C CE '19 JASCE 219 E 18th St New York City
Lieut CEC USN Christianstad St Croix Virgin Islands
Gehring, Edwin W CE '00 MAMedA MAAAS MA Coll Physns
Physician 131 State St Portland Me
Gehring, Herbert A CE '03-----15516 Hilliard Rd Lakewood O
Geibel, Edward M CE '16 144 Millbank Ave Greenwich Conn
Lubricating Oil Dept Socony Tientsin China
Gelder, Walter H CE '98-----704 E Montgomery Ave
Engr M of W Ashland Coal & Iron Ry Ashland Ky
Gelser, Charles S CE '03-----Dalton N Y
Consulting Engineer
George, Edward CE '75-----Nassau N P Bahamas B W I
Merchant
George, Henry H 3d AB CE '12--1831 Monument Ave Rich-
mond Va
George, Sidney G CE '05-----MSPEE 118 Falls St Ithaca N Y
Prof Mechanics School of Civil Engrg Cornell Univ
Gerwig, Walter H CE '05-----131 13th St Parkersburg W Va
Secy Bentley & Gerwig Furniture Co
Getman, Frank L CE '99-----Lyons N Y
Pres & Genl Mgr Cuban Importing Co Lonja del Comercio
518 Havana Cuba
Gibb, Walton CE '09-----4650 Locust St Philadelphia Pa
Leather Manufacturer 54th & Grays Ave
Gibbs, J Lynn CE '10-----1001 Decatur St Watkins N Y
Asst Engr N Y State Hwy Comm Hornell N Y
Gibson, G Edward CE '03-----115 N Allen St Albany N Y
Asst Engr N Y State Engrs Office Telephone Bldg
Gideon, Abraham CE '95-----MASCE Army & Navy Club
Mngng Dir Metropolitan Water Dist (Manila P I
Gifford, Robert L CE '91--MASCE Oak Knoll Pasadena Calif
Pres Illinois Engrg Co 21st St & Racine Ave Chicago Ill
Gildea, Ray Y CE '12--MECIBa 5225 York Rd Baltimore Md
Tel Engr Md Pub Serv Comm 1725 Munsey Bldg
Gillett, Maurice E CE '21--8 Gillett Court Niagara Falls N Y
General Contractor Medina N Y
Gillette, Harold S CE '10-----501 Wheat Bldg Ft Worth Tex
Sen Hwy Engr U S Bur of Public Roads
Gilmore, Alvin L CE '08-----AASCE MAAE
Consulting Engineer Cortland N Y
Gilmore, Harry W PhB CE '01-----
Giltner, Louis C CE '01-----Nueva Gerona Isle of Pines W I
Cashier National Bank & Trust Co
Girard, Peter F Jr CE '22-----163 1/2 Broadway Rochester N Y
29 Edgerton Rd Arlington 74 Mass
Glose, Robert L CE '15-----447 S Rebecca St Pittsburgh Pa
Secy National Steel Fabric Co Union Arcade
Goepel, Frederick N CE '07-----46 Riverside Dr N Y C
Goff, Albert L CE '11-----Elba Genesee Co N Y
Reclamation Work
Golden, Harry E CE '91-----701 Becker St Schenectady N Y
Desng Engr General Electric Co Bldg No 23
Goldstein, Hyman W CE '12 1388 Eastern Pkwy Brooklyn NY
Chief Engr Bldg Prods Co Summitt & Sandusky Sts
Toledo O
Goldstein, Joseph CE '18-----1748 Washington Ave N Y C
Berger Mfg Co 516 W 25th St
Gomez, José A PhB CE '08-----AMASCE Box 713 Guayaquil
Tech Commr for Sanitation of Guayaquil [Ecuador S A
Gons, Louis R BS CE '13-----New Brunswick N J
Engr George B Rule Co
Gonzalez, Rafael A CE '11--AMASCE Quebradillas P R
Chief Engr Isabela Irrigation Serv
Goodman, Benjamin S CE '14--JASCE 2908 Keyworth Ave
Room 709 47 W 34th St N Y C [Baltimore Md
Goodman, Max CE '12-----130 W 116th St New York City
Industrial Consultant 30 Church St
Goodman, Robert B CE '94-----Goodman Wis
Manager Goodman Lumber Co
Goodrich, Clinton R CE '05-----AMASCE Minonk Ill
Commr of Public Works City Hall Utica N Y
Goodwin, Harry L CE '15-----MAAE Deerfield N Y
Benedict Co E Syracuse N Y
Gordon, Fred F CE '93-----MASCE 75 S Union St
Civil Engr Eastman Kodak Co Rochester N Y
Gordon, George CE '17-----117 Chenango St Binghamton N Y
Estimator Bldg Constr The Foundation Co N Y C
Gouinlock, Harold CE '12-----Box 77 Warsaw N Y
With Climax Corp Mfrs Agr Implements Batavia N Y
Gould, Carl A CE '07-----435 Humboldt St Denver Colo
Civil Engr 1121 First Natl Bank Bldg
Grafman, William E CE '15--1365 Carroll St Brooklyn N Y
Grafman Constr Co Bldrs & Genl Contrs
Graham, Leland L CE '09-----506 Winsor St Jamestown N Y
Vice-Pres Chapman & Graham Inc Genl Contrs
Graham, Roland R CE '12-----AMASCE 217 McLean Ave
Asst Engr Am Br Co 30 Church St N Y C [Yonkers N Y
Graham, Samuel A CE '11 c/o Elwood Knapp 469 W 152d St
Certainted Products Corp Woolworth Bldg N Y C [N Y O
Graham, William S CE '16--2306 Elsinore Ave Baltimore Md
Sales Engr Bldg Specialties 21 W Saratoga St
Grantz, Walter A H CE '20-----44 72d St Brooklyn N Y
Field Engr D P Robinson & Co 125 E 46th St NYC
Graves, Walter J CE '99 MASCE 134 Hazelwood Ave Detroit
Engr Mich Mutual Liability Co 1600 Real Estate [Mich
Exch Bldg
Gray, Edward T CE '01-----126 Tioga St Johnstown Pa
Gray & Claflin Engineers
Gray, Joseph H CE '17-----615 Jefferson Ave Elizabeth N J
Amer Tel & Tel Co 195 Broadway N Y C
Gray, Ralph CE '21-----Maine N Y
N Jersey Dist W S Comm 142 Clinton Ave Newark N J
Greeley, Dana S CE '05 ME-----Cotton Exchange Bldg N Y C
Traveling Mfrs Repr in S America
Green, Charles N CE '88-----MASCE Haddonfield N J
Consulting Engineer
Green, Francis K CE '21-----JASCE Middleburg Va
Civil Engr Box 129 Holden W Va
Green, Joseph L CE '12-----4472 Oakenwald Ave Chicago Ill
Green, Robert P CE '80 MCE '83--MESSa Swarthmore Pa
Civil Engineer 615 N Chester Rd
Greenawalt, William E CE '87-----85 S Sherman St
Metallurgist Denver Colo
Greene, Carleton AB CE '91-----MASCE 151 W Turrell Ave
Cons Engr 52 Vanderbilt Ave N Y C [S Orange N J
Greene, Wallace CE '74-----2024 Hillyer Place N W
Patent Lawyer McGill Bldg Washington D C
Grieg, Robert S CE '13-----Eldred Sullivan Co N Y
Asst Supt Constr Brookwood Farms Barryville N Y
Gridley, William G CE '09-----MAAE 106 E Chemung Place
Civil Engr QMC Ft Mason San Francisco Calif [Elmira N Y
Griffin, Lawrence CE '10-----439 Highland Ave Woodlawn Pa
Ind Engr Jones & Laughlin Steel Co
Griffith, Fred C CE '20-----1426 Oneida St Utica N Y
With N Y Tel Co YMCA 55 Hanson Pl Brooklyn N Y
Grime, John R CE '15-----Cazenovia N Y
Civil Engineer
Griswold, Hayden L CE '16-----Rocky Hill Conn
Chief Party State Hwy Dept S Manchester Conn
Griswold, Horace S CE '08--13 Murray St Binghamton N Y
Retail Lumber Dealer 21 Glenwood Ave
Griswold, Jonas W CE '01-----50 Grove St Pawtucket R I
Grogan, Matthew J CE '23-----Rumson N J
Engrg Asst Pub Serv Prodn Co of N J 80 Park Pl Newark
N J
Gronfine, John J CE '17-----845 Fillmore Ave Buffalo N Y
Lieut CEC USN Navy Yard Puget Sound Wash
Gross, Max CE '17-----752 Quincey St Brooklyn N Y
Draftsman Gas Dept Riter-Conley Mfg Co Leetsdale Pa
Grossman, Joseph G CE '12-----699 W 133d St N Y C
Machine Shop Auto Parts
Grossman, Max CE '12-----Atlantic City N J
Manager Grossman's Hotel
Gruener, Clarence E CE '07 819 Church St Richmond Hill N Y
Civil Engineer
Guest, John L CE '21--JASCE 1506 West Ave Richmond Va
Desng Engrg Dept Southern Power Co Charlotte N C
Guilbert, Richard T CE '17-----311 W 101st St N Y C
With Agr Mfg Co Bush Terminal No 20 Brooklyn N Y
Gulick, Charles W CE '22-----209 W Park Ave Champaign Ill
Desng Engr Llewellyn Iron Works Los Angeles Calif
Gumboldt, Frank W Jr CE '21-----Katonah N Y
Solicitor Fred D Schnebke Co Inc Ins Brkers 45 John St
New York City
Gurney, Frank M CE '12-----35 East St Oneonta N Y
City Engineer City Hall
Haas, S Ward CE '01-----R F D 1 Bound Brook N J
Asst Chief Draftsman Union Miniere du Haut Katanga
25 Broadway N Y C
Hacker, Theodore W CE '17-----MECIB Baltimore Md
Civil Engr Norton Bird & Whitman 1828 Munsey Bldg
Hadley, Eugene J BS '71 CE '73 LLB-----
Lawyer 6 Beacon St Boston Mass
Haefner, Carl W Jr CE '05-----AMASCE
Sales Engr 68 State St Albany N Y
Haggart, William H R CE '17--1003 First Ave Fargo N D
Haggart Construction Co
Haight, Andrew H BS CE '97-----R D 27 Millbrook N Y
Haldeman, Lester T CE '22-----Westville N J
Bldg Engr Bell Tel Co of Pa Philadelphia Pa
Hales, Felix S BE in CE CE '16 MAAE MAREA 3315 Euclid
Asst Engr N Y C & St L RR Co Cleveland O [Hts Blvd

- Haley, Francis A CE '19---630 Gotham St Watertown N Y
M of W Dept N Y C R R
- Hall, Bruce L CE '10---Cooperstown N Y
Pres Bruce L Hall Inc Retail & Wholesale Fuel Feed & Bldg Supplies
- Hall, Earle W CE '14---107 Linden Ave Arlington N J
Desng Engr Standard Oil Co of N J Elizabeth N J
- Hall, Frederic F CE '00 MASCE 2411 Hillside Ave Berkeley
Str Engr 251 Kearny St San Francisco Calif [Calif]
- Hall, S Payson CE '10---R F D Ithaca N Y
- Ham, D Harvey CE '14---824 Seventh Ave Spokane Wash
- Hamilton, Charles F CE '97---MASCE
Pres Pyramid Coal Corp Box 69 Marion Ill
- Hamlin, Harold F CE '05---Lakeville Conn
- Hammel, Victor F CE '07 MASCE 1001 N Center St Joliet
Engr Elect Bond & Share Co 71 Broadway N Y C [Ill]
- Hanchett, Willis H CE '14---MAAE 42 Adams St Brockport N Y
- Haney, Albert P CE '10 AMASCE 6 Summit Ave Amsterdam
Chief Engr John J Turner & Sons Engrg Contrs [N Y]
- Hanf, Porter V CE '15---MAAE Box 54 San Bernardino Calif
Chief Draftsman Southern Sierras Pow Co Riverside Calif
- Hankerson, John J BCE MCE '94---Glencoe Minn
Railway Location and Construction
- Hanna, Elias S CE '13---Suez Egypt
Engineer Egyptian State Rwy
- Hannan, David E CE '07---AMASCE 4446 Drexel Blvd
Cons Engr and Arch 155 N Clark St Chicago Ill
- Hannigan, James CE '22---1221 Wyoming Ave Forty Fort Pa
Asst Field Engr Sanderson & Porter Williamsport Md
- Hanson, George C CE '08---129 Main St Bridgeport Conn
U S Consul Chungking China
- Hanson, Herbert C CE '09---1837 Monterey Rd S Pasadena Calif
National Park N J [N Y]
- Hardecker, John F CE '17---8415 Manor Ave Woodhaven
National Park N J [N Y]
- Hardin, George D CE '13---MWSE 4816 Kenwood Ave
Mun Contr 3139 Indiana Ave Chicago Ill
- Harding, Carroll R CE '10---MAREA 15 Woodruff Ave
Cons Engr S Pac Co 165 Bldy N Y C [Brooklyn N Y]
- Harding, Robert J CE '03---MASCE 417 W Summit Ave
Vice-Pres. & Genl Mgr San Antonio W S Co San Antonio Tex
- Harger, Wilson G CE '05---296 Aldine St Rochester N Y
Engineer N Y State Highway Comm
- Harn, John E CE '15---JASCE 3104 Remington Ave Balto Md
Secy-Treas Willard E Harn Co Inc 2314 Oak St
- Harrington, Arthur W CE '09---AMASCE Slingerlands N Y
Dist Engr U S G S 704 Journal Bldg Albany N Y
- Harris, Charles W BS CE '05---MPNWSE Seattle Wash
Acting Head Dept of Civil Engrg Univ of Wash
- Harris, Joseph S CE '13---MAAE 937 E 156th St N Y C
Jun Engr Transit Constr Comm 49 Lafayette St
- Harrison, Alrich S CE '17---MWSE 18 E 41st St N Y C
Res Mgr Minwax Co 327 S La Salle St Chicago
- Harrison, Bernard J CE '20---600 Argyle Rd Brooklyn N Y
Asst Sales Mgr Van Kannel Revolving Door Co 250 W 54th St N Y C
- Harrison, George E CE '23---145 Leadenhall St London Eng
- Harrison, Howard G CE '07---Box 2176 Spokane Wash
Secretary The Day & Hansen Security Co
- Harshbarger, Elmer D CE '01---AMASCE 2239 Wightman St
Pres Pitt Constr Co 1218 Fulton Bldg Pittsburgh Pa
- Hart, Emmet E CE '87---MAREA 2101 Adelbert Rd
Chief Engr N Y C & St L RR Cleveland O
- Hart, Linton CE '14---AMASCE 76 Marshall St Brookline
V-P Rollin Constr Corp 80 Boylston St Boston Mass [Mass]
- Hartman, Eugene L CE '11---201 Luzerne Ave W Pittston Pa
Treas Hartman Supply Co 210 Blackman St
- Hartmayer, Herbert W K CE '20 52 W Oakland Pl Buffalo
Engr in Chg Constr Natl Analine & Chem Co [N Y]
Marens Hook Pa
- Hartwell, Clarence L CE '01---Wilkes-Barre Pa
Civil & Mining Engr 506 Miners Bank Bldg
- Hartz, Roger S B AB CE '13---Palmyra Pa
With Claiborne-Johnston Contr Co Baltimore Md
- Harwood, Warner CE '16---7743 N Paulina St Chicago Ill
Asst Engr of Design Cook Co Hwy Dept Court House
- Hasbrouck, Carl J CE '20---Highland N Y
Bond Salesman Bankers Trnst Co Wall St N Y C
- Haskell, Eugene E CE '79---MASCE FAAAAS Ithaca N Y
Dean Emeritus Coll Civil Engrg Cornell Univ
- Haslam, Erwin E CE '96---MASCE 323 E Wallace Ave
Civil & Hydr Engr New Castle Pa
- Haswell, John R CE '09---AMASCE 409 S Atherton St
Specialist Farm Mechs Ext State Coll Pa
- Hatt, W Kendrick AB CE '91 PhD MASCE MAREA Lafay-
Director Hwy Res Nat Research Council [ette Ind]
Washington D C
- Hauck, Thomas S CE '10---2131 Dunksland Ave Baltimore Md
Lumber Business 717 S Caroline St
- Haupt, Max CE '06---5 Plumstead Ave Lansdowne Pa
Civil Engineer 1713 Sansom St Philadelphia Pa
- Havelin, Julius E CE '22---956 57th St Brooklyn N Y
Top Draftsman Dept of Docks New York City
- Havens, Rodman W CE '80---MBEC 3202 Clarendon Rd
Civil Engineer Brooklyn N Y
- Havens, William L CE '16---AMASCE 12319 Osceola Ave
San Engr 648 Leader News Bldg Cleveland O
- Hawley, Abraham L CE '86---El Paso Texas
General Auditor El Paso & Southwestern Ry
- Hawley, John B Jr CE '21---JASCE 912 College Ave
Civil Engineer [Fort Worth Tex]
- Hayden, John E CE '12---MLSMInInst Ishpeming Mich
Mining Engineer Cleveland Cliffs Iron Co
- Hayes, Edward BCE '78 CE '90---MASCE Cohoes N Y
City Engineer
- Hayes, Herbert E CE '09---18 Amity St Cohoes N Y
Engrg Examiner State Civil Service Comm Albany N Y
- Hayes, Jeremiah J CE '16---1043 Clay Ave N Y C
Fitzdale Paper Co Fitzdale Vt
- Hayes, John CE '97---Central Aguirre P R
Superintendent Ponce & Guayama R R
- Hayford, John F CE '89---MASCE MWSE FAAAAS
Director Coll of Engrg Northwestern Univ Evanston Ill
- Healy, Edwin S CE '12 AAIEE 46 Adams Pl Glen Ridge N J
Asst Engr Elect Bond & Share Co 71 Broadway N Y C
- Healy, Gerald F CE '15---Flint Mich
Vice-Pres G A Kelly Co Real Estate & Constr
- Hedden, Edward CE '87---439 Thatcher St Boise Ida
Civil Engineer
- Heidt, Charles P CE '15---973 Whitlock Ave N Y C
Colony Printers 799 Broadway
- Heinitsh, George M CE '15 264 Spring St Spartanburg S C
e/o Jones & Loughlin Steel Co Pittsburgh Pa
- Heise, Walter F CE '11---1027 Rambler Ave Phila Pa
Plant Engr McClintie-Marshall Constr Co Pittstown Pa
- Heller, John W CE '01 AMASCE 9 Osborne Terr Maplewood
Engrg Contr P O Bldg South Orange N J [N J]
- Hemmings, Harry H CE '17---639 E Third St Brooklyn N Y
Civil Engr Russell Sage Found 130 E 22d St N Y C
- Henderson, Henry C CE '72 LLB---75 Mamaroneck Ave
Lawyer 5153 Chapel St Albany N Y [White Plains N Y]
- Henderson, Thomas R CE '07---514 S 42d St Philadelphia Pa
- Hendricks, Ernest D CE '03---MASCE Fort Plain N Y
Div Engr State Engineer's Office Albany N Y
- Hendrickson, Geo L CE '11---R D 2 Danville Pa
Asst Engr Amer City Engrg Co Peoples Bank Bldg Pitts-
burgh Pa
- Hendry, Robert W CE '14---1337 Pensacola St Honolulu T H
Engr of Hile Dept of Pub Works Hilo T H
- Herman, Abbott P CE '19---627 Maplewood Ave Ambridge Pa
Draftsman American Bridge Co
- Hermann, Charles E CE '21---4601 Maryland Ave St Louis
Reliance Whiting Co 16th & Easton Sts Alton Ill [Mo]
- Herr, Frederick J CE '07---419 Fourth St Brooklyn N Y
Hardware Merchant 284 Fifth Ave
- Herriman, Morris W CE '20---320 N Franklin Ave River
e/o John Sutton Wapakoneta O [Forest Ill]
- Herrmann, Frank CE '14---MAAE AMASCE
Asst State Engr Dept of Hwys Oklahoma City Okla
- Hertel, Frederick E CE '15---68 Linden Road Melrose Mass
Engr Stone & Webster Inc 147 Milk St Boston Mass
- Heslop, Paul L CE '14---AMASCE MAAE 1723 19th St N E
Hydr Engr with C B Hawley of Wash D C [Washington DC]
Clarion Pa
- Hess, Seth G CE '15---200 Cathedral Parkway N Y C
Real Estate 607 Fifth Ave
- Hettinger, Harold I CE '21---879 Stephensen St Freeport Ill
e/o Venezuelan Sun Ltd Aptdo 34 Maracaibo Venezuela
- Hettrick, Ernest F CE '10---Birmingham Ala
E F Hettrick Engrg Co Engrs & Contrs 223-4 Jefferson Co
Bank Bldg
- Heubeck, Elmer CE '12 Fifth Ave Regnel Hts Baltimore Md
Engr Pa Water and Power Co Lexington Bldg
- Hewitt, George W CE '09---119 Jefferson Ave Niagara Falls
Cary-Hewitt Metal Works Inc Buffalo N Y [N Y]
- Higley, Lee CE '97---New Meadows Ida
Asst Cashier Meadows Valley Bank
- Hilborn, Edwin CE '91---MSEENV MNGS Port Leyden N Y
Asst Engr Barge Canal Off Herkimer N Y
- Hilborn, William H CE '10---Phoenix N Y
- Hildreth, Norman E CE '09---46 Waverly St Pittsfield Mass
V-P J R Hampson & Co Inc Genl Contrs 184 North St
- Hill, Curtis CE '97---MASCE 402 S Elmwood Ave
Civil Engineer City Hall Kansas City Mo
- Hill, Harry W CE '13---1503 N Caroline St Baltimore Md
Capt U S A C A C Corozal Panama C Z

- Hill, John E *MS CE MCE* '95-----MASCE FAAAAS MSPEE
Prof Civil Engrg Brown Univ Providence R I
- Hill, Raymond C *CE* '12-----430 Van Houten St Paterson N J
- Hill, Theodore W *CE* '93-----Bellefontaine O
Contracting Engineer
- Hillemeier, Arthur *CE* '09-----58 West Seventh St Mt Vernon NY
Civil Engineer
- Hillman, Charles A *CE* '17-----215 Roseville Ave Newark N J
- Hilpert, Meier G *BS CE* '01-----MASCE 33 W Church St
Asst Engr Beth Steel Co Bethlehem Pa
- Hilton, Joseph C *CE* '96-----AMASCE 8 Larchmont Ct Larch-
Supt J G White Engrg Corp 43 Exch Pl N Y C [mont NY
- Himes, Albert P *CE* '16-----MAAE 3181 Essex Rd Cleveland Hts
Asst Engr N Y C & St L RR Co Cleveland O [O
- Hineck, Frederick W *CE* '10-----359 E 25th St Brooklyn N Y
Structural Engineer E 46 St N Y C
- Hinks, Warren H *CE* '12-----846 Franklin St Johnstown Pa
Mem Firm Fetterman Engrg Co 705 Johnstown Trust Bldg
- Hirsch, Emanuel *CE* '20-----MAAE Amityville N Y
10 Pine St Binghamton N Y
- Hiscoek, George S *CE* '19-----Box 1084 Southampton N Y
Salesman Morrison Dinkey & Todd Co Bonds Diamond Bank
Bldg Pittsburgh Pa
- Hoard, Prescott D *CE* '05-----140 Wadsworth Ave N Y C
- Hobart, Charles B *CE* '98-----105 N Wissahickon Ave Ventnor
Aptdo 164 Merida Yucatan Mex [N J
- Hock, Harold L *CE* '16-----19 Burwell Ave Lancaster N Y
Asst Engr N Y State Comm of Hwy Buffalo N Y
- Hoehn, Charles E *CE* '13-----Albany N Y
Jun Engr N Y State Barge Canal
- Hoff, Edwin J *CE* '22-----137 S First St Mt Vernon N Y
Asst Engr N Y State Gas & Elec Corp Ithaca N Y
- Hoff, Trygve W *CE* '21-----337 Park St Upper Montclair N J
c/o Olaf Hoff Cons Engr 50 Church St N Y C
- Hoffeld, Henry R *CE* '87-----Lancaster N Y
Mem Firm R Hoffeld Co 65 Carroll St Buffalo N Y
- Hoffert, J Raymond *CE* '11-----AMASCE 12 S 19th St
In Chg Des & Constr Seet Pa State Dept of Health Harris-
burg Pa
- Hoffman, Charles A *CE* '17-----MTS 153 N Fourth St Reading
Mgr Planning Dept Vanity Fair Silk Mills [Pa
- Hoffman, Karl W *CE* '23-----3908 McKoon Ave Niagara Falls
Designer Wright & Kremers Genl Contrs [N Y
- Hofstadter, Meyer *CE* '13-----342 Stuyvesant Ave Brooklyn N Y
Contrg Engr McClintie-Marshall Constr Co 3647 Broadway
N Y C
- Hogan, Joseph V *CE* '08-----AMASCE 224 Paddock St Water-
[town N Y
Chief Engr The Arundel Corp Pratt St Baltimore Md
- Hoge, Philip B *CE* '08-----949 Cross Ave Elizabeth N J
Asst Engr Inv & Report C E Knoepfel & Co N Y C
- Holbrook, Roy B *CE* '10-----23 Oxford Rd Newton Center Mass
Old Virginia Orchard Co Front Royal Va
- Holdridge, Earl B *CE* '11-----1024 Euclid Ave Syracuse N Y
Sales Engr Truscon Steel Co 440 The Gurney Bldg
- Holland, Franklin E *CE* '12-----4214 Western Ave Montreal PQ
Mgr Rwy Sales Dept Sherwin-Williams Co of Can Ltd [Can
- Holloway, Arthur P *CE* '07-----223 Upper Mountain Ave Mont-
Salesman Wheeling Steel Corp Wheeling W Va [clair N J
- Holloway, Henry F Jr *CE* '15-----223 Upper Mountain Ave
[Montclair N J
- Holmes, Edward *CE* '05-----MAAE 2844 Park Pl Toledo O
Terminal Engineer Willys-Overland Co
- Holmes, Edward B *CE* '12-----216 Main St Keene N H
Mining Engr Casilla 216 Oruro Bolivia S A
- Holmes, Glenn D *CE* '96-----MASCE 204 W Kennedy St
Chief Engr Intercepting Sewer Board Syracuse N Y
- Holmquist, Carl G *CE* '10-----47 W 49th St N Y C
Exeter Machine Works 30 Church St
- Holt, Thomas B *CE* '19-----402 Stewart Ave Ithaca N Y
Union Pacific Coal Co Rock Springs Wyo
- Holzman, Jacob C *CE* '10-----135 William St N Y C
Civil Engineer
- Hood, Thomas S *CE* '21-----124 East 32nd St Indianapolis Ind
Student Harvard Univ Cambridge Mass
- Hooker, Elon H *AB AM CE* '94 *PhD* '96-----907 Fifth Ave NYC
Pres Hooker Electrochemical Co 25 Pine St
- Hopkins, Cecil B *CE* '07-----AMASCE San Francisco Calif
Mgr Steelform Contrg Co 681 Market St
- Hopkins, Frank S *CE* '11-----50 S Clinton St Poughkeepsie N Y
Assistant Engineer Board of Public Works
- Hopkins, Howard C *CE* '03-----2337 Fargo St Los Angeles Calif
Civil Engineer
- Horner, George W *CE* '73-----R D 2 Belmont N Y
- Horton, Albert H *CE* '98-----AMASCE MWSE 1307 Gallatin St
Hydr Engineer U S G S Washington D C
- Horton, Philip Z *CE* '10-----MAAE AMASCE Peoria Ill
Civil & San Engr 401 Central National Bank Bldg
- Hou, Chia Y *MCE* '19 JASCE 31 Zan Ka Da Soochow China
Tangshan Univ Tangshan China
- Hough, Floyd W *CE* '19-----JASCE 82 Bridge St Catskill N Y
Jun Hydro & Geod Engr USC&GS Salinas Calif
- Hough, Lawrence C *CE* '14-----AMASCE East Falls Church Va
New Eng Pepr Pitometer Co 710 Albany St Boston Mass
- Hourigan, Michael W *CE* '23-----2450 E 15th St Brooklyn NY
Asst Engr Alphons Custodis Chimney Constr Co N Y C
- Houston, Levin J Jr *AB CE* '01 MAAE Fredericksburg Va
City Manager
- Howard, David A *CE* '11-----3123 N St Washington D C
- Howard, John E *CE* '23-----W Bridgewater Mass
- Howard, Thomas *CE* '01-----758 Gotham St Watertown N Y
Asst Engr N Y State Highway Comm
- Howe, Harry N *CE* '04-----AMASCE Memphis Tenn
Engr Gardner & Howe 76 Porter Bldg
- Howell, Charles J *CE* '19-----24 S Seward Ave Auburn N Y
Sales Engr Pittsburgh-Des Moines Steel Co Pittsburgh Pa
- Howell, Eric V *CE* '14 *MCE* '18-----Southampton N Y
Instr School of Civil Engrg Cornell Univ Ithaca N Y
- Howland, Charles A *CE* '12-----MECK 5822 Locust St
Asst Engr Benham & Mullergren Firestone Bldg Kansas
City Mo
- Howland, Rufus B *CE* '72-----Trumansburg N Y
Retired
- Hoy, William W *CE* '95-----1225 French St Santa Ana Calif
Consulting Engineer 413 N Main St
- Hoyt, Herbert B *CE* '09 MAWPA 294 South Ave Bradford Pa
Hagerman Bldg Colorado Springs Colo
- Hoyt, John C *CE* '97 MASCE MWASCE 1446 Belmont St N W
Hydr Engr in Chg Ssr Waters Div U S Geol Survey Wash-
ington D C
- Hoyt, Lawrence W *CE* '22-----29 Pleasant St Danbury Conn
- Hoyt, Raymond H *CE* '15 180 Greyrock Place Stamford Conn
- Hoyt, William G *CE* '09-----AMASCE 4618 S Salina St Syracuse
Hydr Engr U S G S Washington D C [N Y
- Hsia, T S *MCE* '21-----Anhui China
- Hsu, Chen Kuang *BSCE MCE* '23 34 Ho ja jo Lane Hangehow
Draftsman Amer Bridge Co Peneoyd Pa [China
- Hsu, Yush S *CE MCE* '12-----Tung Wu Col Soochow China
Asst Engr Canton Hankow Ry Changsha Hunan China
- Hu, Tung Chao *BS in CE MCE* '05-----MCHES Shanghai China
Chief Tech Dept Nanking-Hunan Ry Nanking China
- Huang, Chia-Chi *MCE* '18-----MSSCh MCHES Swatow China
Engr M of W Chao-Chow & Swatow Ry
- Huestis, Charles C *AB CE* '92 AMASCE 112 Northwood Blvd
Pres Carbon Mining Co Carbon Ind [Greencastle Ind
- Hugger, Albert J *CE* '21-----2354 Madison St Ridgewood N J
Traffic Dept N Y Tel Co 15 Dey St N Y C
- Hughes, Norman *AB CE* '10-----Jackson N C
Manager II & W W Newbern Co Powells Point N C
- Hulburt, Lucius S *CE* '03-----AMASCE Brasher Falls N Y
Sen Asst Engr N Y State Engrs Off Albany N Y
- Hulse, Shirley C *CE* '02-----MASCE Bedford Pa
Supt of Constr Jarrett-Chambers Co 621 Broadway New
Orleans La
- Hunkin, Alger E *CE* '20-----Lakeland Ave & Clifton Blvd
Bldg Supt Hunkin-Conkey Constr Co Cleveland Ohio
- Hunkin, Samuel E *CE* '17-----15907 Lake Ave Cleveland Ohio
Constr Supt Hunkin-Conkey Constr Co
- Hunt, Clinton S *CE* '13-----387 Aberdeen St Rochester N Y
- Hunt, Guy H *CE* '08-----Los Angeles Calif
Univ of Southern Calif
- Hunt, Harold G *CE* '22-----16 Benefit St Worcester Mass
Engr Draftsman Power Constr Co 35 Harvard St
- Hunt, Sidney E *CE* '94-----Portlandville N Y
Minister Methodist Episcopal Church
- Hurlbut, Hinman B *CE* '01 MASCE 125 Elm St Montclair NJ
- Hurley, John P *CE* '07-----
U S Consul Riga Russia
- Hurley, John W *CE* '10-----Council Bluffs Ia
Griffin Wheel Plant Box 416
- Hutchison, James H *CE* '06-----Box 282 Newark Del
Contracting Engineer
- Hutson, Arthur C *BS CE* '05-----27 N 2nd St E Orange N J
Asst Chief Engr Nat Board Fire Underwriters 76 William
St N Y C
- Hyatt, Edward K *CE* '10-----St Louis Mo
Pres Taylor-Hyatt & Co Contrs
- Hyde, Alfred T *CE* '73-----Colchester Pl Lorton Va
Constr Cumberland Pipe Lines in Kentucky
- Hyde, Edward W *CE* '72 *MCE* '74-----MAIA Cincinnati O
Actuary Columbia Life Ins Co 4th & Elm Sts
- Hyde, Howard E *CE* '00-----MASCE 302 W Seneca St Ithaca NY
Pres Young & Hyde Inc Produce Exch Bldg N Y C
- Hyde, Richard L *CE* '17-----JASCE 411 Friendship St Provi-
[dence R I
- Hynds, Harold D *CE* '12 AMASCE 66 Orange St Brooklyn NY
Supt Geo B Post & Sons Syracuse Hotel Syracuse N Y

- Icasiano, Abelardo R CE '17-----MAAE Bulacan Bulacan P I
Engr Manila R R Co Houdague Tayabas P I
- Iglehart, Joseph A W CE '14-----1406 Park Ave Baltimore Md
Pres J A W Iglehart & Co Inv Bonds Title Bldg
- Infanger, Adolph O CE '18-----24 Watson Ave E Orange N J
Banking with Bank of New York 48 Wall St N Y C
- Ingalls, Owen L CE '86-----Phelps N Y
Asst Engr U S Engineers Office Galveston Tex
- Ingalls, Robert D CE '17-----Phelps N Y
Lieut Corps of Engrs USA Ala Polytech Inst Auburn Ala
- Ingersoll, Vernon S CE '98-----10 Scott Place Rockville Center
Civil Engineer [N Y]
- Irving, James N CE '11-----AMASCE 525 S Van Ness Ave
Asst Engr Quinton Code & Hill Cons Engrs Los Angeles Calif
- Irwin, A Charles BS MCE '16-----MAAE MAREA
Engr Portland Cement Assoc Chicago Ill
- Ivanek, Bertram B CE '20-----Mt Hermon Mass
Asst Engr Off State San Engr Springfield Ill
- Jackson, J Ceylon CE '15-----New Milford Pa
Jun Engr U S Engrg Dept First District N Y C
- Jackson, Leon E CE '10-----55 Field St Rochester N Y
Civil Engr Rochester Gas & Elect Corp
- Jackson, William CE '90-----AMASCE 7417 Church Ave Ben
Engr Amer Bridge Co Pittsburgh Pa [Avon Pgh Pa]
- Jacobs, Robert H CE '93-----MAAE MASOE
Div Engr Transit Constr Comm 49 Lafayette St N Y C
- Jacoby, Hurlbut S AB '08 CE '10-----MASCE 6523 Euclid Ave
Secy & Chief Engr The H K Ferguson Co [Cleveland O]
- James, Robert L CE '12-----21 W 93d St N Y C
Vacuum Oil Co 15 Rua de Ilorta Secca Lisbon Portugal
- James Wilbur O CE '23-----540 Rutter Ave Kingston Pa
- Jamney, William H CE '74-----Baltimore Md
Secy & Treas House of Reformation 205 Vickers Bldg
- Japhet, W Ernst BS CE '08-----Box 735 Houston Tex
Secy-Treas Southern Engrg Supply Co 98 1/2 Main St
- Jaret, Milton AB '13 CE '14-----1954 84th St Brooklyn N Y
- Jarvis, George M CE '78-----742 Penn Ave San Antonio Tex
Retired
- Jenkinson, Richard D CE '07-----15 N Howard Ave Bellevue Pa
Real Estate and Insurance
- Jennings, Louis C CE '10-----135 Pelham St Newport R I
Res Engr The Foundation Co Ltd St Jerome P Q Can
- Jenrick, William F BS CE '10-----AMASCE 113 White St
Estmr Stone & Webster Engrg Corp 147 [Waverly Mass
Milk St Boston Mass]
- Johnson, Albert M CE '95-----6353 Sheridan Road Chicago Ill
Pres National Life Ins Co of U S A 29 S La Salle St
- Johnson, Albert T Jr CE '11-----Box 743 Antioch Calif
Constr Engr Great Western Electro-Chem Co Pittsburgh Calif
- Johnson, Berkeley CE '20-----93 Fairfax Road Worcester Mass
Water Resources Br USGS 615 Idaho Bldg Boise Idaho
- Johnson, C Reid CE '13-----2902 St Paul St Baltimore Md
Lieut CEC U S N Submarine Base New London Conn
- Johnson, Donald S CE '15-----Evanston Hotel Evanston Ill
- Johnson, Eugene C CE '05-----686 Catalina St
Chief Engr Pacific Elec Ry Co Los Angeles Calif
- Johnson, Harvey S CE '11-----65 Sussex St Port Jarvis NY
Asst Western Sales Mgr of Bossert Corp of Utica N Y
Utica N Y
- Johnson, Hollister CE '12-----AMASCE MALBSCE Dryden N Y
Asst Engr Black River Regulating Dist Watertown N Y
- Johnson, James A CE '13-----215 Buffalo St Warsaw N Y
President Oatka Engrg & Constr Co Inc
- Johnson, Lawrence CE '01-----MASME Youngstown N Y
Works Mgr The Agricultural Implements Co Ltd Tatanagar India
- Johnston, Clifford C CE '12-----
Dupire Bros Rubber Dept Singapore Straits Settlement
- Johnston, Edgar CE '00-----733 Park Ave E Orange N J
Combustion Engineer 2 Rector St N Y C
- Johnston, Jesse C CE '13-----308 E Olive St Lamar Colo
Merchant
- Johnston, Miles C AB BS CE '12-----209 N Plum St
Supt Carnel & Johnston Arehts and Engrs Richmond Va
- Johnston, William R Jr CE '05-----28 Yale St Maplewood N J
Engineer D L & W R R
- Jones, Bevan CE '06-----15 W 38th St N Y C
- Jones, Harold H CE '10-----3412 Second Ave W Vancouver B C
Logger 921 Vancouver Block
- Jones, Henry H CE '20-----Durham N C
e/o State Highway Comm Raleigh N C
- Jones, Jacob O BS MCE '15-----AMASCE MSPEE
Assoc Prof Hydrs Univ of Minn Minneapolis Minn
- Jones, William M CE '18-----480 Convent Ave New York City
e/o John W Ferguson 152 Market St Paterson N J
- Josefson, Abraham CE '22-----5 E Main St Middletown N Y
Draftsman Amer Bridge Co Elmira N Y
- Joseph, Louis W CE '20-----Warrensburg N Y
601 W 151st St New York City
- Joseph, William B CE '13-----75 Saragossa St St Augustine Fla
- Judson, David H CE '07-----71 W Cayuga St Oswego N Y
- Justin, Joel D CE '06-----MASCE 743 Amherst St Buffalo N Y
Engr Day & Zimmerman Philadelphia Pa
- Kampf, Louis CE '09-----33 Division St Norwich Conn
Textile Engr Anderson Meyer & Co Tientsin China
- Kang, Shih-Cheng MCE '22 Sing Chang Pootung Shanghai [China]
- Kaufman, Abraham CE '15-----
Kaufman, Ernst G CE '11-----AMASCE 315 Adelphi St Brook-
Estmr Boldt Constr Co Cleveland O [lyn N Y]
- Kaufman, Morris L CE '12-----1145 Carroll St Brooklyn N Y
469 Seventh Ave New York City
- Kaufman, Samuel CE '19-----1389 Stebbins Ave New York City
Engr First Holding Co 198 Broadway
- Keating, Thomas F Jr CE '17-----11 E 87th St N Y C
Engrg Dept Plate & Robb Ins Brkrs 100 William St
- Keays, Reginald H CE '95-----AMASCE
Chief Engr Moffat Tunnel Comm Denver Colo
- Keeler, Louis V CE '13-----77 Madison St Jamaica N Y
Broker Crude Rubber 24 Stone Street N Y C
- Keenan, James N CE '09-----535 W 113th St New York City
Dist Sales Mgr H H Robertson Co 170 Broadway
- Kehler, Sherman I CE '94 MCE '03-----1800 Oakley St Balti-
Assoc Civil Engr City of Baltimore [more Md]
- Kelhoe, Harry CE '08-----35 E Utica St Oswego N Y
Civil Engineer
- Kehrlahn, Charles J CE '09-----MAAE MCIES 13600 Fourth
Chief Draftsman [Ave E Cleveland O]
- N Y C & St L R R Cleveland O
- Keller, Arthur R CE '03-----AMASCE 2456 Oahu Ave Honolulu
Civil Engineer Univ of Hawaii [T H]
- Kelley, Charles L CE '85-----Main St Savannah N Y
Civil Engineer
- Kelley, George B CE '08-----1 Thirteenth St Upper Troy N Y
- Kelley, William D BS MCE '81-----MASCE Cleveland O
Kelly-Demarest Constr Co 418 American Trust Bldg
- Kellogg, George D CE '07-----Greenwood N Y
Asst Engr N Y State Engrs Dept Tel Bldg Albany N Y
- Kelly, Edward DeV CE '10-----Oriskany N Y
- Kelly, Edward J Jr CE '12-----61 W Erie Ave Corning N Y
- Kelsey, Clifford S BA CE '88-----162 Remsen St Brooklyn N Y
Secy-Treas & Vice-Pres Realty Associates
- Kelsey, Sidney E CE '87-----1824 Jefferson St Kansas City Mo
Asst Cndt & Prof Math Wentworth Mil Acad Lexington Mo
- Kendall, Charles H CE '95 MS-----MASCE
County Highway Engineer Sugar Land Tex
- Kennedy, James C CE '79-----Sacramento Calif
Consulting Engineer Box 1072 Motor Route B
- Kennedy, Robert C CE '21-----East Rochester N Y
Jun Asst Engr N Y State Hwy Dept Rochester N Y
- Kerby, Charles K CE '15-----559 E 29th St Brooklyn N Y
Real Estate & Ins 110 William St N Y C
- Kerby, Russell T CE '13-----322 Linden Ave Brooklyn N Y
Engr Am Tel & Tel Co 195 Broadway N Y C
- Kessler, William CE '13-----23 Ninth St Woodside N Y
Asst Engr U S G S 328 Custom House San Francisco Calif
- Kibbe, Harmon C CE '16-----JASCE 2524 Benvenne Ave
Salesman Cobbledeck Kibbe Glass Co Berkeley Calif
- Kidde, Reguar T CE '13-----215 W 101st St New York City
- Kiddie, John CE '04-----MAAE MAIME Mprenci Ariz
Mine Supt Longfellow Mining Div Arizona Copper Co
- Kiep, Henry A Jr CE '10-----R F D 55 Westfield N J
- Kinber, George F CE '12-----1253 Casgrain St Detroit Mich
- King, Alvin W CE '07-----MASME 2 Girard Pl Maplewood N J
Dist Sales Mgr Fulton Co 50 Church St N Y C
- King, Everett E AB CE MCE '11-----AMASCE MAREA
Prof Rwy Civil Engrg Univ of Ill Urbana Ill
- King, Leon T CE '10-----Great Bend Pa
- King, Paul CE '16-----Emporia Va
Engr & Survr Atlantic Coast Realty Co Petersburg Va
- King, Tang MCE '21-----406 Hankow Road Shanghai China
Nanyang Construction Co
- King, Tao CE '12-----AMASCE 33 Tou Fa Hutang West City
Res Mem Comm on Ry Technies Min of Communications
Peking China
- Kingsland, Lawrence D H CE '17-----e/o Col E B Robins
15 Chestnut St Boston Mass
Engr Foundation Co Rifa 332 Lima Peru S A
- Kinnear, Eugene C CE '07 1882 Columbia Rd Washington D C
- Kipp, Frederiek M Jr CE '14-----JASCE 3705 Chestnut Road
Asst Engr Conservation City Water Dept Baltimore Md

- Kirschner, Charles *CE* '14 AMASCE 427 Fourth St Troy N Y
Asst Engr Gulf Refining Co 2701 Sixth St Port Arthur Tex
- Klaber, John J *CE* '06-----MAIA
Architect 101 Park Ave New York City
- Kleeka, Joseph *MCE* '22--10 Dobrovskeho Brno Czechoslovakia
2638 S Roman Ave Chicago Ill
- Knapp, Frank H *CE* '11-----Blasdel N Y
225 Park St Bridgeport Conn
- Kneeland, Herbert D *CE* '10--MESWPa 230 Breeding Ave
Prod Mgr Untd Engrg & Fdry Co [Ben Avon Pgh Pa
2311 Farmers Bank Bldg Pittsburgh Pa
- Knighton, John A *CE* '91--MASCE 207 W 107th St N Y C
Div Engr Dept Pl & Strs 2221 Madison Ave
- Knoch, Julius J *MS CE* '92--1717 Gains St Little Rock Ark
Carler & Knoch Cons Engrs 803-807 A O U W Bldg
- Knowlton, George E *CE* '20--240 Goodwin Ave Ridgewood N J
- Knowlton, Robert H *CE* '06--MNELA MAEE 211 Cornell
Power Engr United Gas Imp Co [Ave Swarthmore Pa
Philadelphia Pa
- Koester, Edwin F *CE* '13--1917 Washington St Wilmington
Engr in Chg Surveying Dept Municipal Bldg [Del
- Kohn, Arthur H *CE* '06--401 E Seventeenth St Brooklyn N Y
- Kolberk, Andrew *CE* '12--305 E 161st St New York City
Assistant Engineer I R T Co 165 Broadway
- Koo, Mao-Hsun *BSCE MCE* '23--24 Shu-Yuen Loong Wusih
[Kiangsu China
- Koo, Nee Sun *MCE* '19 *PhD* '21--MESCh Nai Wai Shanghai
[China
- Koopman, Jacob *CE* '13--29 Richmond St Elizabeth N J
- Korff, Harry O *CE* '16--2226 Garrison Ave Wallbrook Md
- Kornfeld, Harry *BS CE* '11--AMASCE 106 Stratford Ave
Engr Bldg Dept General Electric Co [Pittsfield Mass
- Kraft, George L *CE* '15-----
Captain U S A 42d Inf Camp Gaillard Panama C Z
- Kramer, Edwin W *CE* '06--1801 S Fifth St Missoula Mont
Dist Hydro-Elect Engr U S For Service 508 Montana Bldg
- Kratzenstein, Hugo *AB CE* '04--7 E 94th St New York City
2004 Continental Commercial Bank Bldg Chicago Ill
- Krause, Alois W *CE* '12--152 Crafts St Newtonville Mass
Secy Geo E Warren Co 35 Congress St Boston Mass
- Krauss, John S *CE* '17--974 St Nicholas Ave N Y C
- Kristal, Frank A *CE* '08--842 W 179th St New York City
- Kronberg, Sol *AB CE* '08--615 W 150th St N Y C
Secy Supertone Talking Machine Co 18 W Twentieth St
- Kruse, Otto V *CE* '09--AMASCE Philadelphia Pa
Hyd Engr Larner-Johnson Valve & Engrg Co Colonial
Trust Bldg
- Krusi, Herman *CE* '82--2033 Central Ave Alameda Calif
Retired
- Kuck, John F R *BS CE* '12--MAAE 215 Waldburg St
[W Savannah Ga
Asst Engr Central of Ga Ry Savannah Ga
- Kupfer, Max *CE* '22--891 DeKalb Ave Brooklyn N Y
- Kureias, Max *CE* '18--63 E 177th St New York City
Civil & Refrig Engineer U R D Green 154 Nassau St
- Kurtz, Ford *CE* '07--MASCE Palatina Ave Hollis N Y
With J G White Engr Corp 43 Exchange Pl N Y C
- Kurz, Ernst W *CE* '17--AMASCE 805 E State St
Treas Ward-Kurz Co. Contrs & Bldrs Ithaca N Y
- Kwei, Ming King *MCE* '22--1558 Kashing Road Shanghai
[China
Draftsman American Bridge Co Trenton N J
- LaBrequé, Henry F *CE* '07--126 Winthrop St Brooklyn N Y
113 South St Holyoke Mass
- Laezette, Alfred A *CE* '13--ASME AMASCE
c/o Standard Oil Co of Brazil Rio de Janeiro Brazil
- LaCroix, Arthur E *CE* '16--734 Pleasant St Worcester Mass
Asst to Hydr Engr New England Power Co 35 Harvard St
- Lahr, Charles *CE* '15--51 Chicago St Elmhurst N Y
- Lamoureux, Vincent B *CE* '20--Forest Home Ithaca N Y
Jun Engr Bridge Dept Div of Hwys Springfield Ill
- Lanahan, Howard G *CE* '09--124 W 15th St Spokane Wash
Building Materials 318 N Division St
- Lance, John H *CE* '96--MASCE 426 Rutter Ave Kingston Pa
Cons Engr 616 2d Nat Bank Bldg Wilkes-Barre Pa
- Lance, William L *CE* '08--60 N Franklin St Wilkes-Barre Pa
Cons Engr with J H Lance Cons Engr
- Landa, Francisco *CE* '07--MCUSE Paseo 194 Vedado
Govt Engr Inspr Hav Elec Havana Cuba
- Landis, Charles W *CE* '00--14 Hamilton Ave Cranford N J
Asst Contr Mgr U S Steel Products Co 30 Church St N Y C
- Landon, Eugene A *CE* '80--MASCE Groton N Y
Secretary and Treasurer Regent Lumber Co
- Lane, Emory W *CE* '14--AMASCE 1038 Health St Lafayette
Mgr China Off Morgan Engrg Co Yang Chow China [Ind
- Laupher, Edwin E *CE* '99--540 Sheridan St Pittsburgh Pa
Division Superintendent Bureau of Water
- Lara, Edward M *CE* '03-----Bend Ore
Cashier First National Bank
- Larned, William H *CE* '84-----Haigler Neb
Cashier State Bank of Haigler
- Lathrop, John P P *CE* '92--MECPh Wynnewood Pa
Civil Engineer and Contractor Overbrook Pa
- Latting, Benjamin F *CE* '94-----Muncie Ind
Designing Engr Indiana Bridge Co
- Lau, Wau W *AB* '14 *CE* '15-----Tientsin China
Assistant Engineer River Improvement Comm
- Lauck, Edward W *CE* '22--119 S Court St Luray Va
Civil Engr Truseon Steel Co 521 Dixon Bldg Norfolk Va.
- Lavine, I William *CE* '15--253 Tompkins Ave Brooklyn N Y
Bldr & Contr 9110 Lefferts Ave Richmond Hill N Y
- Lawrence, Frank E *CE* '06 AMASCE 415 W 36th St Savannah
Repr Wills & Sons & McCarthy Mauzano de Gomez 436 [Ga
Havana Cuba
- Lawrence, Theodore F *CE* '88-----Chester N Y
Cheese Manufacturer
- Lawson, David T *CE* '73-----
Lay, Charles H *CE* '74--149 W Third St Oil City Pa
Retired
- Lazo, Antonio *CE* '07--108 E 82d St New York City
Investment Banker 120 Broadway
- Lechler, Bruno C *CE* '08 *LLB*--MASME 222 Prospect Ave
[Maywood N J
Mgr Sugar Mach Dept Fletcher Works Philadelphia Pa
- Ledger, William H *MCE* '95 MICE Railway Crescent Becroft
Metropolitan Railway Construction Sydney N S W
- Lee, A Carl *CE* '10--MASCE Charlotte N C
Div Engr Southern Power Co Box 600
- Lee, Don *BS in CE CE* '13--AMASCE San Angelo Tex
Sales Engr Lakewood Engrg Co 711 Sumpter Bldg Dallas
Tex
- Lee, Haw-Shen *CE* '16--Yu Yao Chekiang China
Eng Secy to Chf Engr Tientsin-Pukow Ry Tientsin China
- Lee, K *MCE* '17-----Shanghai China
- Lee, Kohn Sam *CE* '13--30 Scott Road Shanghai China
Business
- Lee, Teh Tsing *CE* '11 *MCE* '12-----Tientsin China
In charge Des & Dr Off Wks Dept Chili River Comm
- Leggett, Edward H Jr *CE* '12 MAISCE 8 S Allen St Albany
Auditor's Office The Delaware & Hudson Co [N Y
- Lehman, Alvin S *CE* '21--339 Moss Ave Peoria Ill
Supt Federal Warehouse Co
- Lehrbach, Henry G *CE* '15 AMASCE 344 Prospect Ave Buffalo
Supt Mtnce Board of Ed Los Angeles Calif [N Y
- Lehrbach, Warren W *CE* '17--Box 262 Calipatria Calif
Ranch Manager
- Lent, C Hersey *CE* '11--484 Mansfield Pl Brooklyn N Y
Secy Brown Lent & Pett Inc 90 William St N Y C
- Leonard, Edward P *CE* '09--409 Macon St Brooklyn N Y
c/o J G White Engr Corp 43 Exchange Pl N Y C
- Leonard, Samuel J *CE* '17--520 G St NE Washington D C
Engr The Stair Sales Co Inc 26 S Broadway Akron O
- Lesechen, William F *BS CE* '09--6409 Enright St St Louis Mo
Oil and Coal By-Products 601 Bank of Comm Bldg
- Lessin, Samuel *CE* '12--1578 Union St Brooklyn N Y
- Leung, Chin-Yuk *CE* '14 *MCE* '15--Jardine Matheson & Co
[Tientsin China
- Levine, Harold J *CE* '12--AMASCE 140 E 92d St
Kaufman & Levine Cons Engrs 56 Pine Street N Y C
- Levine, Lionel M *CE* '10--530 Manhattan Ave
Cons Engr 29 Broadway New York City
- Levine, Samuel *CE* '11--355 Riverdell Ave Brooklyn N Y
- Levy, Robert *CE* '13--P O Box 598 Woodmere N Y
Mgr Textile Leather Co Brown St & Lister Ave Newark N J
- Lewis, Clarence C *CE* '91 MASCE 1815 E 89th St Cleveland O
Gen Mgr Cia Luz y Fuerza Cordoba Argentina S A
- Lewis, Dudley L *CE* '08--2509 May St Fort Worth Tex
City Engineer City Hall
- Lewis, John H *CE* '03--AMASCE MORSE Portland Ore
Cons Engrs 606 Rwy Exch Bldg
- Lewis, John M *CE* '08--MAIM&ME Elkhorn W Va
Chief Engineer Houston Interests
- Lewis, Roger *CE* '95 *LLB* '97--320 W 78th St N Y C
Lawyer Care Guthrie Jerome Rand & Kresel 44 Wall St
- Li, Chuan Heng *CE* '18--MAREA 18 Kennedy Road
Genl Supt M of W Dept Yueh-Han R R Hong Kong China
- Li, Kien Yo *CE* '11--Kalgan China
Office Chief Engineer Peking Kalgan Ry
- Liang, Cho-Yu *BSCE MCE* '23-----
c/o Tangshan Univ Tangshan China
- Liesbeskind, Morris *CE* '21--215 E 103d St New York City
Draftsman American Bridge Co Trenton N J
- Lilly, Scott B *BS CE* '09--144 Washington St Hempstead N Y
Dist Sales Mgr Ohio Locomotive Crane Co 30 Church St NYC
- Lima, Gustavo *CE* '23--Fajardo P R

- Lindau, Sigmund B CE '18-----MAAE
Jun Asst Engr N Y State Hwy Comm Hornell N Y
- Lindberg, Henry E CE '19-----900 Federal St Pittsburgh Pa
Designer Pittsburgh-Des Moines Steel Co 607 Curry Bldg
- Linnell, Herbert H CE '20-----JASCE 19 Florentine Gardens
Asst Civil Engr Miranda Sugar Co [Springfield Mass
Central Miranda Oriente Cuba
- Linsley, Charles W CE '07-----MASCE 52 E Utica St Oswego NY
Plant Engr Oswego Candy Wks and Long's Chocolate Wks
- Linton, Orlando H CE '06-----Univ Club Montreal PQ Can
Vice-Pres Canadian Comstock Co Ltd Constr Engrs
- Liu, Chi Sheng CE '22-----PE 3 Elgin Road Shanghai China
Draftsman American Bridge Co Elmira N Y
- Livant, Charles D CE '17-----196 Bay 31 St Brooklyn N Y
- Livermore, Norman B CE '95-----MASCE San Francisco Calif
Pres N B Livermore & Co 1306 Merchants Nat Bank Bldg
Lo, Chung Chem CE '10-----Nan Ying St Foochow China
Dean Civil Engrg Tangshan Coll Tangshan China
- Lo, Ying CE '16 JASCE Hae-Dou-Hon St Nan Chang China
Engr M of W CGR Tientsin-Pukow Line Tientsin China
- Lockerby, Robert A CE '06-----87 St Matthew St Montreal Can
- Lockwood, Ralph H CE '73-----6326 Lakewood Ave Chicago Ill
Retired
- Loeffler, Hermann C CE '16-----21 McKinley Ave Glendale N Y
Civil Secy Citizens Union 41 Park Row N Y C
- Loh, Yuen Chang CE '14-----12 Lane Hong Shing Teng Paoshan
Asst Supt of Constr Standard Oil Co Shanghai China [Rd
- Long, Arthur M CE '12-----122 Porter Ave Warren O
Asst Gen Mgr Sales Dept The Trumbull Steel Co
- Long, Guy E CE '02-----67 Park Place Kingston Pa
Civil Engineer
- Longwell, John S AB CE '10-----AMASCE Powell Wyo
Mgr Shoshone Proj U S Reclamation Service
- Loomis, Arthur B BS MCE '94-----Teledo O
Standard Engrg Co
- Loomis, Van Wyck W CE '14-----Attica N Y
Stock Slsmn Bell Tel Securities Co 195 Brdwy N Y C
- Loomis, Willis H CE '94-----28 Rock Island St
Pres W H Loomis Tale Corp Gouverneur N Y
- Lopez, Carlos CE '09-----Iloilo Iloilo P I
Surveyor 34 Yznart St
- Lord, Charles H CE '11 MAWWA Crescent Park Ogdensburg
Superintendent City Water Works [N Y
- Lord, George W CE '20-----Box 174 La Jolla Calif
Engr Southern California Edison Co Los Angeles Calif
- Lordly, Henry R CE '93 MCE '20-----MASCE MEIC 74
Cons Engr Montreal P Q Can [Strathern Ave
- Lott, Henry D CE '15-----1672 Hendrickson St Brooklyn N Y
Civil Engr Post & McCord Constr Co 101 Park Ave N Y C
- Love, Albert J CE '09-----92 Downer Place Aurora Ill
Vice-President Love Brothers Inc
- Loveland, Chester H CE '10-----465 California St
Cons Engr Merchants Exch Bldg San Francisco Calif
- Lovell, Earl B CE '91-----AMASCE 160 Broadway N Y C
Prof Civ Engrg Col Univ Mgr & Chf Engr E & S Dept
Lawyers Title Ins & Tr Co Vice-Pres Charles Hansel Co
- Lu, En Hsu MCE '22-----Ta Sha Mao Hsian Nanking China
Lu, Feng Shu CE '18-----MChES Wusih Kiangsun China
Asst Engr Peking-Hangkow Rwy
- Lucas, Albert CE '23-----31 W 84th St New York City
- Luchetti-Otore, Antonio S CE '10-----AMASCE San Juan P R
Asst Chief Engr P R Irrigation Service Guayama P R
- Luchetti, Raul CE '20-----MAAE 122 Gillette Ave Buffalo N Y
Asst Engr Dept of Interior San Juan P R
- Ludlow, J Wyman ME CE '03 MASCE ME&AAS 552 12th St
Harbor Engr Port of Los Angeles City Hall San Pedro Calif
- Lum, Paul B CE '07 MSAE 1361 Otis Pl N W Washington D C
Mgr Autocar Sales & Service Co 1240 Penn Ave N W
- Lund, Gabriel E CE '17-----AMASCE 34 Butler Pl Brooklyn NY
Div Engr Atlantic Fruit Co Cayo Mambi Oriente Cuba
- Lyerly, Charles A Jr CE '09 4487 McPherson Ave St Louis Mo
First Natl Bank Chattanooga Tenn
- Lyle, Alexander Jr CE '13-----61 W 50th St New York City
Res Engr Booth and Flinn Ltd
- Lyman, Richard R BS MCE '03 PhD '05 AMASCE Salt Lake
Prof Civil Engrg Univ of Utah Pres [City Utah
Lyman-Callister Co 47 E S Temple St
- Lynch, Edmund CE '12 MAAE 44 Hawthorn Ave Crafton Pa
San Engr Amer Sheet & Tin Plate Co Pittsburgh Pa
- Lynch, James H Jr CE '19 MAAE 237 Plymouth Ave Buffalo
Office Engineer Erie RR Hornell N Y [N Y
- MacBean, Donald G CE '23-----Lawnton Ave Oak Lane Phila Pa
Asst Engr Calif & Ore Power Co Medford Ore
- MacBean, John P Jr CE '20-----Lawnton Ave Oak Lane Phila Pa
Asst Engr Bay Constr Co Summer Bldg St Petersburg Fla
- MacDiarmid, Milo S CE '95-----MASCE Highland Park Mich
Asst Engr USLS 205 Old Custom House Detroit Mich
- MacDonald, Harold G CE '07-----Edmonton Alberta Can
Reed & MacDonald Contractors
- MacGregor, Ross E CE '18-----MAAE Wanaque N J
Civil Engineer
- MacHarg, John B CE '93 AB PhD-----414 W 121st St Rome NY
- MacKellar, Gordon CE '20-----147 N Church St Hazelton Pa
Desnr & Draftsman Luzerne Co Road & Bridge Dept Wilkes-
Barre Pa
- MacKen, Harold I CE '20 62 Westervelt Ave New Brighton NY
N Y Tel Co 15 Dey St New York City
- MacKrell, Edwin A CE '12-----971 E 18th St Brooklyn N Y
Engr D L & W R R Hoboken N J
- MacLeod, Norman L CE '11-----4947 Kimbark Ave Chicago Ill
Asst Nearer Ager & Lord Tie Co 80 E Jackson Blvd
- MacMannis, Thomas E CE '22-----66 Broadway Frostburg Md
Asst Engr M of W Dept B & O R R Baltimore Md
- MacVeagh, Wayne CE '16-----472 Hephurn St Williamsport Pa
Instr Math & Sc Vocational Dept C H S Coatesville Pa
- McArthur, Joseph W MCE '17 MAAE 1873 Garden St Eugene
Civil Engineer with City [Ore
- McCarthy, John R CE '17-----4761 Richardson Ave N Y C
Jr Engr Crew Levick Co 111 N Broad St Philadelphia Pa
- McCausland, Elmer J CE MCE '97 MASCE MECISTL MAAE
Dean of Engrg Dir Engrg Exp Sta Univ of Mo Columbia Mo
- McClain, Carl A CE MCE '16 MAAE AMASCE 1033 High St
Genl Supt & Secy Eugene Water Board Eugene Ore
- McClatchy, John B CE '22-----Merion Pa
Builder 848 Land Title Bldg Philadelphia Pa
- McClintock, Ward G CE '13-----1109 N Cayuga St Ithaca N Y
Engineer Bldgs & Grounds Cornell Univ
- McClure, John H CE '19-----Box 1014 Cristobal C Z
Res Engr Pittsburgh-Des Moines Steel Co
- McClure, Ross G CE '16-----MAAE 208 N Calif Ave Chicago Ill
Engrg Dept Western El Co Hawthorne Ill
- McConnell, Ira W CE '97-----MASCE MAAE Dobbs Ferry N Y
V-P Dwight P Robinson & Co Inc 125 E 46th St N Y C
- Mc Cormick, J Gould CE '10-----821 Broad Ave Belle Vernon Pa
- McCrone, Walter C CE '14-----St Johnsville N Y
Milling Business
- McCurdy, George E CE '05-----Berwyn Ill
Barstow & McCurdy Cons Engrs Akron Ohio
- McCurdy, John C BS CE '12-----Forest Home Ithaca N Y
Prof Rural Engrg Coll of Agr Cornell Univ
- McDermott, Thomas C CE '22 46 Hanceek St Stoneham Mass
Cost Engr West Penn Rys & Pow Co 14 Wood St Pittsburgh
Pa
- McDowell, Edwin T CE '11-----77 S Main St Middletown Conn
- McGowan, Henri C BS EE CE '17 2624 Walton Way Augusta
Sales Engr H W Johns-Manville Co 210 N Broad St [Ga
Philadelphia Pa
- McHarg, Leslie CE '99-----AMASCE 144 Westside Ave Free-
Pres & Treas McHarg-Barton Co Contractors [port N Y
1323 Broadway New York City
- McHugh, Austin G CE '14-----71 Aldrich St Buffalo N Y
Draftsman Youngstown Sheet & Tube Co Youngstown O
- McKraig, Thomas H BArch CE '13-----Orchard Park N Y
Cons Arch Eng 781 Ellicott Sq Buffalo N Y
- McKee, William J CE '09-----308 Western Ave Aspinwall Ia
- McKeever, William CE '98-----MAGI MIES 1830 Rittenhouse Sq
Cons Engr 34th & Chestnut Sts Philadelphia Pa
- McKinstry, Ross W CE '18-----JASCE 5131 Kimbark Ave Chi-
Structural Engr 101 Fourth St Hinsdale Ill [eago Ill
- McKown, Howard P CE '09-----AMASCE 18 Ann Arbor Ave
Engr J Tener Barr Contrg Engr Pitts- [West View Pa
burgh Pa
- McLeod, Donald F CE '07-----MASCE MSP'EE
Prof Mun Engrg Univ of Miss University Miss
- McLoughlin, A Vincent CE '20 54 Liberty Ave New Rochelle
[N Y
- McMath, Neil C CE '14 MDES 1023 Parker Ave Detroit Mich
Mgr Buhl Stamping Co Walkerville Ont Can
- McMillin, Edwin R CE '17 293 Savannah Ave Wilkesburg Pa
Engineer Pittsburgh Bridge & Iron Works Rochester N Y
- McNair, George H S CE '18-----Roseland Ave Essex Fells N J
Comm Engrg Dept N Y Tel Co 15 Dey St N Y C
- McPherson, Kenneth W CE '09-----Castle Shannon Pa
Engineer Pittsburgh Railway Co
- Ma, Yu Chi CE '19-----Liau-a-au Amoy China
San Engr West Palm Beach Fla
- Maabs, Arthur J CE '22-----1637 Quarrier St Charleston W Va
Insptr Eastern Petroleum Co Union Bldg
- Maas, Charles L CE '15-----315 Yale Ave Swarthmore Pa
Prod Engrg United Gas Imprt Co Broad & Arch Sts Phila-
delphia Pa
- Macedo, Jose B CE '17 Avendo Rio Brance 60 Rio de Janeiro
Engineer for Coal Mining Co [Brazil
- Mack, Harry E CE '01-----Box 2 Marathon N Y
Engr and Draftsman Amer Road Machinery Co Inc
- Mackenzie, Donald A CE '17-----Mill Neck N Y
Engrg Dept Hay Foundry & Iron Works Newark N J

- Mackintosh, William *CE* '96--1213 W 16th St Oklahoma City [Okla]
Mackintosh Walton Co Cons Engrs State National Bank Bldg
Macleish, Gordon G *CE* '12--Box 38 R F D La Habra Calif
Civil Engineer
Macpherson, David J *CE* '77--1120 Atchison St Pasadena Calif
Retired.
Macy, Frank H *CE* '10--26 Eighth St Hudson N Y
Asst Civil Engr N Y State Conservation Comm Albany N Y
Maey, Paul *CE* '13 MRES MAAE 43 Raines Pk Rochester NY
Repr Tarvia Dept The Barrett Co 1980 East Ave
Madden, William F *CE* '21--16 Hubbard St Cortland N Y
Constr Engr Raymond Cone Pile Co 140 Cedar St N Y C
Madigan, Francis W *CE* '07--460 Maplewood Ave Rochester
Asst Engr Dept State Engineer and Surveyor [N Y
Magsaysay, Ambrosio *CE* '09--421 Calle Paz Pao Manila P I
Asst Mgr Yancoo Steamship Co 421 Muelle Industria
Maher, Paul L *CE* '13--AMASME 119 Meadow Rd Woon-
Engr The Chas E Bedaux Co Cleveland O [socket R I
Mahoney, Lee C *AB CE* '12--3135 Pacific Ave
Estmg Bldg Constr 1011 Bush St San Francisco Calif
Maier, Edward L *CE* '21 2206 Minn Ave S E Washington D C
Jun Civil Engr U S Engrs Off Old Land Off Bldg
Mallery, Clarence S *CE* '89--412 Front St Owego N Y
Pres Bing Br Co 1104 Press Bldg Binghamton N Y
Mallery, John S *CE* '16--412 Front St Owego N Y
Engrg Dept Hay Foundry & Iron Works Newark N J
Mallison, Charles H *CE* '07--1012 High St Pottstown Pa
Acting Mgr of Erection McClintie-Marshall Constr Co
Malone, George E *CE* '03--521 N Eleventh St Reading Pa
Asst Engr Div of Hwys Springfield Ill
Malthy, Albert E *CE* '76 *LLD PhD* MHistSWPa 507 Stewart
Teacher in College Grove City Pa [Ave
Mamhart, Stephen B *CE* '08 487 Berkeley Ave S Orange N J
Vice-Pres & Dir Thos A Edison Co E Orange N J
Manchester, Wilbur O *CE* '20--Nassau N Y
Deck Off USC&GS 202 Burk Bldg Seattle Wash
Mann, Joseph S *BS CE* '12--Fairfield N C
Mann, Louis M *CE* '77--MWeSE Milwaukee Wis
Asst Engr U S Engr Office Federal Bldg
Mann, Matthew D Jr *PhB CE* '08--625 Locust St Roselle N J
Supt Chem Prod Div Standard Oil Co Elizabeth N J
Mann, Roberts J *CE* '13 *MCE* '14--c/o P E Mann Peoria Ill
Mao, Thomson *MCE* '17--Tangshan China
Asst Principal Tangshan Engrg Coll
Marks, A Lester *CE* '15--MAAE Pabala T H
Engineer Construction Q M
Marsh, Clarence W *CE* '94--MA1ChE MACHS MAES Cos Cob
Cons Engr 101 Park Ave N Y C [Conn
Marston, Anson *CE* '89--MASCE MWeSE Ames Ia
Dean of Engrg Iowa State Coll
Martens, James H C *CE* '21--Shrub Oak N Y
Instr Geol Dept Cornell Univ Ithaca N Y
Martin, Charles E *CE* '21--150 Selye Terrace Rochester N Y
Cadet Engr Public Service Gas Co Newark N J
Martin, J Ward *CE* '19--408 Briar Pl Chicago Ill
Martio, William F *MCE* '06--Modesto Calif
Professor Modesto Junior College
Marvin, Ralph E *CE* '03 c/o Dr F L Marvin Muskegon-Mich
Civil Engrg & Mining 306 London Bldg Vancouver B C Can
Marx, Charles D *CE* '78--MASCE MWeSE MAICE
Prof Civil Engrg Emeritus Leland Stanford Jr Univ & Cons
Engr Stanford University Calif
Marx, Erwin *CE* '00--2562 Observatory Ave Cincinnati O
Prod Mgr The G A Gray Co Gest & Depot Sts
Masters, Frank H *AB CE* '04 MAREA MWeSE 407 Glen-
Asst Chief Engr E J & E Ry Co Joliet Ill [wood Ave
Mauer, William J *CE* '09--MAAE 2624 Central St Evanston
Sales Engr Dwyer Equip Co 4534 W North Ave [Ill
Chicago Ill
Maxeiner, Carl A *CE* '18--486 Yates St Albany N Y
Maxon, Paul J *CE* '13--50 Palisade Ave Bogota N J
Engr with F G Shattuck Co 60 W 23d St N Y C
Maxwell, Donald P *CE* '07--915 E Soles St McKeesport Pa
Cons Engr Aluminum Co of Am Oliver Bldg Pittsburgh Pa
Maxwell, Frank A *CE* '78 *MCE* '79--Georgetown Colo
Deputy County Treasurer Clear Creek Co
Mayhew, Robert *CE* '94--S Holmes St Scotia N Y
Machinist
Maynard, Henry W *CE* '07 MNACA Apt 45 3089 Broadway
Auditor The Salts Textile Mfg Co Bridgeport Conn [N Y C
Mayo, Geoffrey W *CE* '07--AMASCE Smethport Pa
Sen Hwy Br Engr 1912 F & M Bldg Ft Worth Tex
Mead, Daniel W *CE* '84--MASCE MASME MAICE
Prof Hyd & San Engrg Univ Wis Madison Wis
Mead, Robert G 2nd *CE* '17--Ossining N Y
c/o William R Compton Co Bonds New York City
Mead, Theodore L *BCE* '77 *CE* '90--MPhilaAcadNSc
Horticulturist Oviedo Fla
Meehan, John W *CE* '87--MPNWSE 510 Second St
City Engineer Mt Vernon Wash
Meikle, A Craig *CE* '15--3115 Clifton Ave Baltimore Md
Res Engr Norton Bird & Whitman 616 Munsey Bldg
Meissner, Charles R *CE* '12--45 Lenox Road Brooklyn N Y
Riverside Ill
Mellen, Arthur W Jr *CE* '17--2676 Morris Ave N Y C
c/o Harris Forbes & Co Investments N Y C
Mellor, Alfred R *CE* '12--52 Bay State Ave W Somerville
Asst Engr Comm on Pub Works State House [Mass
Boston Mass
Menefee, Ferdinand N *BS in CE CE* '10--AMASCE
Prof Engrg Mechs Univ of Mich Ann Arbor Mich
Meusers, Charles A *CE* '15--MECIB 3145 S Atlanta Rd
Desur U G I Contr Co Broad & Arch Sts [Camden N J
Philadelphia Pa
Menocal, Mario G *CE* '88--Calzada Esq a I Vedado Havana
[Cuba
Merrill, Thomas D *CE* '78--2625 Greysolon Rd Duluth Minn
Lumber Dealer 210 First National Bank Bldg
Mershon, Edward J *CE* '14--AMASCE 27 Spring St Brock-
Contr Engr Pittsburgh-Des Moines Steel [port N Y
Co 807 Curry Bldg Pittsburgh Pa
Meston, Robert S *CE* '16--501 Clara Ave St Louis Mo
Repr St Oil Co of N Y Johannesburg South Africa
Metzger, Harold N *CE* '07--166 Lancaster Ave Buffalo N Y
Member Metzger Construction Co 676 Genesee St
Meyer, August B *CE* '14--34 Claradon Rd Bloomfield N J
Meyer, Henry R J *BS MS CE MCE* '14--MAAE AMASCE
City Engineer Box 144 Havre Mont
Meyers, Clarence W *CE* '02 *MCE* '03--314 Riverside Drive
Rapid Transit Subway Co 165 Bdy [N Y C
Michaelson, Joseph *CE* '92--1234 Girard St N W Washington
Desng Engr Bur Yards and Docks Navy Dept [D C
Michelson, Benjamin C *CE* '19--3215 R St Washington D C
McClintie-Marshall Constr Co Pittsburgh Pa
Middleton, Cornelius W *CE* '16--MSNA&ME Sound Beach
Engr Babcock & Wilcox Co 85 Liberty St N Y C [Conn
Mildon, Reginald B *CE* '00--Lansdowne, Pa
Asst to Vice-Pres Westinghouse Electric Mfg Co Lester Pa
Miles, Hamilton V *CE* '08--Cornell Heights Ithaca N Y
Manager Wisteria Tea Garden
Milhan, David N *CE* '15--AMASCE MASTM Sodas N Y
Asst Constr Engr Sinclair Refining Co Fowler Colo
Miller, Bruce McC *CE* '03--R F D 1 Box 359 McKees
Draftsman Jones & Laughlin Steel Co [Rocks Pa
Pittsburgh Pa
Miller, George *CE* '17--715 S Hope St Los Angeles Calif
Miller, Granbery *CE* '13--4500 Euclid Avenue Cleveland O
Drummond-Miller Co General Contractors
Miller, Harold G *CE* '17--1412 Garfield Ave Wyomissing Pa
Vanity Fair Silk Mills Reading Pa
Miller, John H *CE* '12--238 Argyle Road Brooklyn N Y
N Y Sales Repr Irving Iron Works Co Long Island City N Y
Miner, James H *CE* '00--MAAE AMASCE Bellair Dr Dobbs
Estimator D P Robinson & Co 125 E [Ferry N Y
46 St N Y C
Minnix, Allen C *CE* '15--1820 K St N W Washington D C
Builder
Minsky, George R *CE* '23--242 Oak Hill Ave E Lansing Mich
Mirick, Alfred S *CE* '10--AMASCE Pittsburgh Pa
Dist Engr Eastern Paving Brick Mfrs Assoc
Miscall, Leonard *CE* '19 MAAE 845 Clinton Ave Albany N Y
Asst Engr N Y State Highway Dep
Mitchell, C Maleom *CE* '23--34 E 40th St New York City
c/o Alabama Power Co 120 Broadway
Mitchell, Frank V *CE* '23--247 N Parkside Dr Chicago Ill
Mitchell, Louis A *CE* '02--MASCE MAREA P O Box 235
Engr M of W Union Traction Co of Ind Anderson Ind
Modjeski, Charles E J *CE* '21 222 S Michigan Ave Chicago
c/o Ralph Modjeski Consulting Engineer [Ill
Moeller, Henry L *CE* '07--AMASCE 20 Bellevue Ave Wee-
Chief Engr Martini & Humeke Co of Amer [hawken N J
1201 Hudson St Hoboken N J
Mollard, Charles E *CE* '01--AMASCE Skaneateles N Y
Str Engr American Bridge Co Pittsburgh Pa
Monaghan, Thomas A *CE* '17--460 W 142d St N Y C
Monge, M Arturo *CE* '04--MNatSCE Reconquista 575
Gen Insp Natl Comm Brs & Rds Buenos Aires Arg Rep
Monk, Percy S *CE* '10 MAAE AMASCE R F D 2 Glenshaw Pa
Res Engr c/o C S Davis 802 Century Bldg Pittsburgh Pa
Monroe, Robert L *CE* '22--JASCE Monroe N Y
Amer Bridge Co Treuton N J
Montgomery, James J *CE* '03--5 Orchard St Watertown N Y
Moomaw, Dalton *BS CE* '09--MASCE 1121 Blaine Ave
Civil Engineer South Bend Ind

- Moore, A Kenneth P CE '17---209 Walnut St Montclair N J
Engr Gas Equipment Corp 406 Bloomfield Ave
- Moore, Charles B BS in CE CE '16 MAAE Box 324 Marion Ala
- Moore, Egbert J CE '99---MASCE 397 N Brdy Yonkers N Y
Vice-Pres Turner Constr Co 244 Madison Ave N Y C
- Moore, Frank C CE '92---MASCE 9130 115th St Richmond
Asst Engr Amer Br Co 30 Church St N Y C [Hill L I
- More, Charles C CE MCE '99 MASCE 4545 Fifth Ave N E
Prof C E & Head of Dept Univ of Wash Seattle Wash
- Morehouse, James H CE '23---118 W Eighth St Oswego N Y
- Morelos, Jose R CE '22---1127 Acyteros St Manila P I
- Morgan, J Holloway CE '13---1348 Quincey St N W
Securities Salesman E L Stock Co Washington D C
- Morgans, Howard K CE '07---6148 Commonwealth Ave
Superintendent for Builder Detroit Mich
- Morris, Abraham M CE '22---289 E 98th St N Y C
Draftsman Amer Bridge Co Ambridge Pa
- Morris, Garfield T CE '04 MAAE 319 Sta Clara Ave Alameda
Off Engr Bur Val I C C 731 Wells Fargo Bldg [Calif
San Francisco Calif
- Morris, Philip CE '12-----
- Morris, W Harley CE '09---26 Bar Beach Rd Port Washington
[N Y C
Asst Engr Transit Constr Comm 49 Lafayette St N Y C
- Morrison, Harry CE '23---1504 Gough St Baltimore Md
Asst Engr Central Romana La Romana Dom Rep
- Morton, John W CE '19---200 A St S E Washington D C
- Mosher, Sidney W CE '17 MCE '22---Poplar Ridge N Y
Jun Asst Engr Bronx Parkway Comm Bronxville N Y
- Moss, Berkeley N CE '93---6605 Franklin Ave Los Angeles
Civil Engineering and Land Developing [Calif
- Mosserop, Alfred M CE '85---MASCE Mir&SI (London)
Cons Engr 36 E Boulevard Rochester N Y
- Mueden, George F CE '05-----
- Asst Engr Transit Constr Comm 49 Lafayette St N Y C
- Muench, William O Jr CE '12---1231 S Wilton St Phila Pa
- Mulhearn, Lawrence J CE '13---Bronxville N Y
e/o N Y C R R
- Mullen, Frederick B CE '17---448 Hillside Ave Jamaica N Y
Butler Bldg
- Muller, Leslie CE '96---AMASCE Shelton Wash
Mulliken, Alfred CE '18---MAAE The Walbert Baltimore Md
Civil & San Engr N Y State Dept of Health Albany N Y
- Munsteri, Philip CE '20---78 Starr St Brooklyn N Y
- Munn, Harvey T CE '13---MAAE AMASCE
e/o Natl Bd Fire Underwriters 209 W Jackson Blvd
Chicago Ill
- Munnikhuysen, Walter F CE '15---Bel Air Md
Field Engr H Koppers Co Sault Ste Marie Ont Can
- Munos, José del C CE '91---Rivas Nicaragua C A
Pres of Board of Public Instruction
- Murphy, Edward C CE '84 MS MCE '00---MASCE Napa
Hydr Engr U S Geological Survey [Calif
- Murray, Clare D CE '07---AMASCE DeRuyter N Y
e/o Southern Improvement Co De Witt Ark
- Mussi, Angelo P CE '08 MRES 1909 E Main St Rochester NY
Inspector Dept of Engrg City Hall
- Nagle, James C MA CE MCE '93---MASCE MAAE Dallas Tex
Nagle Witt & Rollins Engrg Co Court House
- Nagler, Salyg CE '18---224 Ave B New York City
Jun Engr Ford Bacon & Davis 577 W 177th St
- Nakamoto, Goichi CE '17---Hilo Hawaii T H
Asst Engr Pacific Engrg Co Honolulu T H
- Nambu, Tsunejiro MCE '88---MJSCE Aomori City Japan
Chief Engr Aomori Harbor Improvement
- Names, Sewell CE '12---MAAE 194 Newfield St Buffalo N Y
General Contractor
- Nash, Jack T CE '16---5416 Victor St Dallas Tex
Chief Office Engr Henry Exall Elrod Co
- Natanson, Walter E CE '13-----
- e/o American Consul Barranquilla Colombia S A
- Neafie, William O CE '20---1833 Mt Vernon St Phila Pa
Res Mgr Wooster Thomas & Co Securities
- Needle, Joseph CE '20---547 King St Charleston S C
- Nelson, Elbert J CE '07---Okechohee Fla
Engr Fla State Road Dept
- Nelson, Harry M CE '08---E Ryegate Vt
645 Academy St New York City
- Nelson, John I CE '12---9716 N Blvd Cleveland Ohio
- Nesbit, Edgar D BS in CE CE '12---Jonesboro Ind
County Surveyor of Jasper Co Rensselaer Ind
- Nesbit, Elmer C BS in CE CE '12---Jonesboro Ind
Engineer Kokomo Ind
- Nethercot, David G CE '20---MWeSE 518 Cherry St Winetka
With Hill Clarke & Co Machinery Merchants [Ill
Chicago Ill
- Neu, Edgar W CE '21---1081 Jefferson St Buffalo N Y
- Neumaier, Martin CE '16---1417 Grand Concourse N Y C
- Neville, Colone W J BS MCE '01-----MASCE
Contr Engr Elks Club New Orleans La
- Newbold, Thomas T CE '14---202 Macon St Brooklyn N Y
Supt Raymond Cone Pile Co 140 Cedar St N Y C
- Newkirk, Arthur D CE '15 MAAE Box 746 Winter Haven Fla
Civil Engineer
- Newman, Thomas S CE '03---905 N Alabama Ave
Engr & Geologist The Newman Co Box 188 Okmulgee Okla
- Nickerson, G Lloyd CE '14-----MAAE
Inspr N Y State Hwy Dept Poughkeepsie N Y
- Nickerson, Paul U CE '22---49 Warren St Needham Mass
- Nieh, Chao-Ling MCE '23---Peking Tech Coll Peking China
- Nisenson, Amos O CE '10 AMASCE 5 Hillside Ave Newark
Civil Engr & Survr Lake & Nisenson 9 Clinton St [N J
- Nitchie, Francis R AB '06 CE '10---424 Lee St Evanston Ill
- Noble, Henry J CE '09---325 Fenn St Pittsfield Mass
151 W 97th St N Y C
- Norton, George H CE '87---MASCE 62 Tillinghast Place
City Engineer 20 Municipal Bldg Buffalo N Y
- November, Nathan CE '19---270 New York Ave Brooklyn N Y
Deck Off USC&GS USS Ranger San Juan P R
- Nussbaum, Walter E CE '15---128 S First St Lehighton Pa
Man Engr Palmer Land Co Palmerton Pa
- Nye, Algernon S CE '88---220 Fourth Ave N Y C
- Ober, John L CE '16---143 Abercom St Savannah Ga
e/o Dwight P Robinson Co 125 E 46th St N Y C
- Oboza, Alfonso G CE '22---Bani Pangasinan P I
- O'Brien, Earl F CE '20---127 Freeman Ave Solvay N Y
- O'Brien, James B CE '11---41 S Second St Steelton Pa
- O'Connor, Bernard CE '13---168 Ash St Watertown N Y
Manager Standard Oil Co Sacramento Calif
- O'Connor, F Barnard CE '13---AMASCE 876 Park Ave
Asst Chief Engr Alphons Custodis Chim Constr Co
95 Nassau St N Y C
- Odessa, Herman P CE '21---JASCE 105 Stockton St Brooklyn
Jun Hydrog & Geod Engr USC&GS Fairbanks Alaska [N Y
- Ogden, Henry N CE '89---MASCE 614 University Ave Ithaca
Prof San Engrg School of Civil Engrg Cornell Univ [N Y
- Ogelsby, Hart D CE '12 MESPa 31 S Front St Harrisburg Pa
- Ogier, George R CE '08---928 Detroit St Denver Colo
Engineer Denver Sewer Pipe & Clay Co
- Ohrt, Frederiek CE '11---AMASCE Courtland Hotel
City & Country Engineer Honolulu T H
- Olds, Thomas H BS CE '07---AMASCE 2347 Elm St Denver
Civil & Hydr Engr First National Bank Bldg [Colo
- O'Leary, James H CE '19---23 Wall St North Adams Mass
Transitman N Y C R R Watertown N Y
- Olin, Franklin W CE '86---MASME 1128 State St Alton Ill
Pres Western Equitable & Egyptian Powder Cos & West-
ern Cartridge Co
- Olhason, Peter CE '02---Watsonville Calif
- Olmstead, Charles H CE '16---AMASCE 1401 Beechwood Ave
Div Engr State Highway Dept Nashville Tenn
- Onley, Willard W CE '79---Bay Minnette Ala
Retired
- Onstott, Virgil S CE '21---Saltsburg Pa
- O'Reilly, Francis S CE '09---619 Tracy St Utica N Y
Minn & Ont Paper Co International Falls Minn
- O'Rourke, Bernard J CE '10---AMASCE 815 Madison St
Engr & Contr O'Rourke Bros 430 Walnut [Syracuse N Y
St Philadelphia Pa
- O'Rourke, Charles E CE '17---450 St Nicholas Ave N Y C
Asst Prof Str Engr Cornell Univ Ithaca N Y
- O'Rourke, Frank H CE '12---AMASCE 815 Madison St
Engr & Contr O'Rourke Bros 430 Walnut [Syracuse N Y
St Philadelphia Pa
- Ormsby, Frank W CE '81---46 W Cayuga St Oswego N Y
Civil Engineer West First St
- Orr, Raymond C CE '22---400 Classon Ave Brooklyn N Y
With John Lowry Bldr 171 Madison Ave N Y C
- Osborne, Alfred B CE '03---W Ridge Ave E Aurora N Y
Engr with Larkin Co 31 Remolino St Buffalo N Y
- Ostrom, John N CE '77---MASCE MAREA East Randolph
Cons Br Engr C B & Q R R 208 S LaSalle St [N Y
Chicago Ill
- Otero, A Lucchetti (See Lucchetti)
- Ourand, William R CE '09---4205 Eastway Toledo O
Willys-Overland Co
- Owen, Elijah H PhB CE '99---AMASCE Detroit Mich
Hull & Owen Archts & Engrs
- Owens, Harold V CE '05---AMASCE 127 Thomas St Utica
Seey and Treas Dale Engrg Co Genl Contrs [N Y
- Paaswell, George CE '08---MASCE 212 W Fordham Rd
Sect Engr Transit Comm 441 E Tremont Ave N Y C
- Pacello, Vincent J CE '17---115 Smith St Port Chester N Y
Desng Engr E E Seelye Cons Engr 101 Park Ave N Y C
- Packard, Daniel B AB CE '04---12 Chenango St Greenville Pa

- Páez, José *CE MCE* '13-----MPHIE&A Malabon Rizal P I
Director Bureau of Public Works Manila P I
- Page, Blinn S *CE* '14-----2455 Longfellow Ave Detroit Mich
Salesman Carnegie Steel Co 1815 Ford Bldg
- Page, William H *CE* '83-----1556 W Collin St Corsicana Tex
Engineering and Farming
- Palacio, Felipe G *BS CE* '09-----4 Calle de Lucciona Mexico
[City Mex]
- Palmer, Benjamin H *CE* '23-----Vergason Ave Norwich Conn
With General Contractor
- Palmer, Charles D *CE* '22-----306 E Seventh St Erie Pa
Asst Engr Ala Power Co Birmingham Ala
- Palmer, Marshall B *CE* '95-----AMASCE 101 Amherst Ave
Cons Engr City Engrs Office Syracuse N Y
- Palmer, Ray S *CE* '97 *DDS* 41 St Pauls Place Brooklyn N Y
Dentist
- Pan, Chu-Hung *MCE* '21-----Wuehow Kwangsi China
- Panton, Edward C *CE* '14-----AMASCE c/o L C Bement Ithaca
[N Y]
Supt Black Canyon Dam U S Ree Service Emmett Idaho
- Paraiso, Juan G *CE* '23-----Lumbang Laguna P I
Asst Engr Dept of Pub Works Manila P I
- Parker, Gilbert E *CE* '16-----820 Fifth Ave Cedar Rapids Ia
Capt U S A 33d Inf Fort Clayton C Z
- Parkhurst, Roger W *CE* '13-----AMASCE 22 S Portland Ave
[Brooklyn N Y]
Engr Repr Barber Asphalt Paving Co c/o Amer Consul
Bombay India
- Parmenter, Richard *CE* '17-----Box 366 Geneva N Y
Shipping Business N Y C
- Parsons, Herbert *CE* '91-----635 W 62d St Chicago Ill
Civil Engineer
- Pasenal, Vicente *CE* '21-----Aragat Pampanga P I
Asst Civil Engr Bureau of Public Works Manila P I
- Paterson, Charles J *CE* '07-----3060 Coleridge Road Cleveland
Pres The Paterson Leitch Co Cleveland O [Heights O]
- Patrick, Arthur S *CE* '15-----61 Farragut Ave Providence R I
- Patten, Harry A *CE* '07-----New Bern N C
Farmer
- Patten, William E Jr *CE* '11-----401 Conklin Ave Binghamton
Prof Hydr Engrg Tangshan Engrg Coll Tangshan [N Y
China]
- Patterson, Burke *CE* '22-----438 Franklin Ave Wilkesburg Pa
Adv Boggs & Bahl Pittsburgh Pa
- Patterson, Harold J *CE* '11-----AMASCE 1070 Carroll St
c/o Phoenix Utility Co New Orleans La [Brooklyn N Y]
- Paulus, Roy *CE* '08-----342 State St Flushing N Y
Paulus-Ullman Printing Corp 295 Lafayette St N Y C
- Paz, Louis *CE* '93-----Pinalejo Honduras C A
- Pearse, Henry B *CE* '13-----MCIES 12601 Edmonton Ave
Real Estate Development and Building [Cleveland O]
- Pearson, Edward J *CE* '82-----MASCE MAREA Hotel Taft
Pres N Y N H & H R R Railroad Bldg New Haven Conn
- Peck, Bertram H *CE* '23-----Port Jervis N Y
Asst Engr Div of Hwys Spurling Bldg Elgin Ill
- Peebles, Stuart L *CE* '11-----141 Fellows Ave Syracuse N Y
Engr c/o Williams Bridge Co N Y C
- Pei, I-Hsiang *MCE* '20-----MSSCh MMSCh JASCE Hung St
[Luehowfu Anhui China]
Engr City Civil Engrg Dept 4 Jitaka Rd Tsingtao China
- Pendergrass, Robert A *CE* '00 *MCE* '01 MASCE 409 Pem-
Asst Gen Mgr McClintie-Marshall [broke Rd Cynwyd Pa
Constr Co Philadelphia Pa]
- Pendleton, Claude M *CE* '18-----Port Dickenson N Y
Instr School of Civil Engrg Cornell Univ Ithaca N Y
- Pendleton, Hunter Jr *CE* '23-----16 Letcher Ave Lexington Va
- Penfield, George W *CE* '00-----McNSe New Hartford Conn
Asst Engr Board of Water Comms Hartford Conn
- Pennywitt, John *CE* '15-----419 Lloyd St Pittsburgh Pa
Standard Oil Co of N Y Shanghai China
- Perkins, Albert H *CE* '93 *MCE* '94-----MASCE MAHSCE
Div Engr Dept State Engr Albany N Y
- Perkins, Frank K *CE* '12-----110 S Tenth Ave Mt Vernon N Y
c/o Commercial Truck Co 405 Lexington Ave N Y C
- Perkins, Nelson S *CE* '15-----110 S Tenth Ave Mt Vernon N Y
- Perlman, David *CE* '19-----608 Louisiana Ave N W
U S Coast & Geodetic Survey Washington D C
- Perlman, Solomon *CE* '23-----370 Riverside Drive N Y C
- Perry, Arthur F Jr *CE* '16-----JASCE 1202 Riverside Ave
[Jacksonville Fla]
Engr O P Woodcock Genl Bldg Constr 421 Duval Bldg
- Pesant, Louis *CE* '15-----McCuSE Box 410 Havana Cuba
Civil Engr Obrapia y San Ignacio
- Philipson, Robert A *CE* '19 MAAE 175 Main St Ossining N Y
Accounting Bernard Reis N Y C
- Phillips, Cushing *CE* '17-----1150 84th St Brooklyn N Y
Lieut CEC USN Paris Island S C
- Phillips, Frederick *CE* '92-----Peterborough N H
Civil Engineer
- Phillips, John M *CE* '14-----AMASCE MAWWA Hayti Mo
Supt & Engr Harrison Engrg & Constr Corp Wichita Kans
- Philp, Burk K *CE* '10 MAAE MLEC Box 438 E Lansing Mich
Asst Prof Civil Engrg Mich Agr Coll
- Pieker, David H *CE* '13-----554 Seventh St Brooklyn N Y
Sales Engr D & M Patents Co 166 Montague St
- Piddian, Joseph *CE* '11-----1172 President St Brooklyn N Y
Supt Constr E Parkway & New York Ave
- Pierce, George C *CE* '09 c/o Lusk & Thompson Chattanooga
Atlantic National Bank Bldg Jacksonville Fla [Tenn]
- Pierce, Leslie E *CE* '16-----JSAE JASCE 129 Grove St Stamford
[Conn]
- Pierce, Orrin J *CE* '13-----Worcester N Y
Jun Asst Engr N Y State Barge Canal Rochester N Y
- Pierce, Paul L *BS CE* '06-----MASCE Birmingham Ala
Consulting Engr Amer Trust Bldg
- Piersol, John A *CE* '17-----AMWSe 612 Meadow Ave Charleroi
With C H Hurd Constr Engr Indianapolis Ind [Pa]
- Pino, Charles N *CE* '03-----1143 Lexington Ave N Y C
Dist Mgr Steel Fabricating Corp Union Bldg Cleveland O
- Pino Farrora, Francisco Jr *CE* '05 211 W State St Ithaca N Y
Tapachula Chiapas Mex
- Piper, William E *BS CE* '09-----199 South Ave New Canaan
Mech & Civil Engineer The Dorr Co 101 Park [Conn
Ave N Y C]
- Pistor, George E J *CE* '01-----MASCE 55 Elstun Rd Upper
Contr Engr Hay Foundry & Iron Works [Montclair N J
15 Madison Sq N N Y C]
- Pitner, Harold L *CE* '13-----Seattle Wash
- Place, Arthur H *CE* '94-----MASCE Blissfield Mich
Engr Bur of Govt Res 316 E Jefferson Ave Detroit Mich
- Ploss, Paul *CE* '11-----3772 Pingree Ave
Ford Motor Co Detroit Mich
- Polack, Waldemar *CE* '21-----515 W 177th St N Y C
Engr Commonwealth Engrg Co 103 Park Ave
- Polak, Henry B *CE* '11-----279 Magnolia Ave Jersey City N J
H B Polak Mfg Co Elect Appliances 10 12 Cook St
- Pologe, Benjamin C *CE* '15-----1253 St Nicholas Ave N Y C
- Ponce de Leon, Felipe *AB CE* '10 McCuSE San Miguel 69 D
Civil Engr Central Presidente Holguin Cuba [Havana Cuba]
- Pond, Ben L *CE* '20-----339 E Market St Stockton Calif
- Pons, Francisco *CE* '09-----MACPR MSIPR Santurce P R
Contracting Engineer
- Poole, Ruble I *BE CE* '10-----AMASCE R D 3 Randleman N C
Civ Engr & Archt Box 830 Raleigh N C
- Pope, Herbert B *CE* '14 209 Washington Ave Haddonfield N J
Supt Turner Constr Co c/o Amer Can Co New Orleans La
- Porter, Harry F *CE* '05-----SIndE 7600 Euclid Ave
Pres & Treas The Conserv-It Co 7600 [Cleveland O
Carnegie Ave]
- Porter, Percy W *CE* '07-----MAAE Box 36 Wilmington Calif
Asst Engr Harbor Dept City of Los Angeles
- Pass, Victor H *CE* '92-----MASCE 2929 Russell St Berkeley
Cons Str Engr 281 Bush St San Francisco Calif [Calif]
- Post, Leland R *CE* '23-----41 Euclid Ave Waterbury Conn
Plant Engrg N Y Tel Co 44 Church St Buffalo N Y
- Potts, Clyde *CE* '01-----MASCE 4 Farragut Pl Morristown N Y
Civil & San Engr 30 Church St New York City
- Powell, Charles U *CE* '98-----MASCE Brdwy & Sanford Ave
Engr in Charge Queens Top Bur Flushing N Y
- Powell, George W *CE* '85-----93 Gorham St Canandaigua N Y
County Engineer
- Powell, Hugh A *CE* '12-----1910 S 16th Ave Birmingham Ala
Office Engineer Alabama Power Co
- Powell, Ralph W *CE* '14-----MSPEE R D 1 Ionia Mich
Head Dept Applied Math Coll of Yale-in-China Changsha
Hunan China
- Pratt, Avery J *CE* '09-----1246 Hertel Ave Buffalo N Y
Genl Mgr R S McManus Stl Constr Co Inc 152 Leslie St
- Pratt, Joshua D *CE* '15-----2048 Nunnau Ave Honolulu T H
Bureau of Census
- Pratt, Roy E *CE* '21-----36 Elm St Franklinville N Y
Jun Asst Engr N Y State Hwy Comm Buffalo N Y
- Pregler, Anton A *CE* '21-----859 Main St Stamford Conn
Engr Pitometer Co 50 Church St N Y C
- Prentice, Thos H *CE* '17-----12 Vermont Ave Southington Conn
- Preston, John O *CE* '17-----5013 Park Hts Ave Baltimore Md
Asst to Pres Warren-Knight Co Philadelphia Pa
- Prettyman, J Edward *CE* '19-----12 King St Seaford Del
Res Engr State Hwy Com Kings Mountain N C
- Price, W Mitchell *CE* '11-----Overhill Rd Ten Hills Baltimore Md
Pres The Price Constr Co 210 Md Trust Bldg
- Priester, Oscar F *CE* '17-----2516 Fulton Ave Davenport Ia
Priester Construction Co Genl Contrs 1006 Kahl Bldg
- Priester, Walter A *CE* '15-----MDaEC 811 W Seventh St
Priester Constr Co Genl Contrs 1006 Kahl Bldg Davenport Ia

- Proctor, Ralph F CE '01-----MASCE
Chief Engr Maryland Casualty Co Baltimore Md
- Purell, Stuart CE '01-----AMASCE 1600 Hilton St
Chief Engineer City Hall Baltimore Md
- Purdy, George L CE '16-----401 Laurens St Olean N Y
Civil Engineer Vacuum Oil Co
- Purdy, Samuel M CE '96 MASCE 470 Third St Brooklyn N Y
J G White Engrg Corp 43 Exchange Pl N Y C
- Queral, Raymond CE '13-----MCuSE Box 1 Puerto Padre Cuba
Civil Engr Central Manati Manati Oriente Cuba
- Quinn, John J Jr CE '17-----495 Eighth St Brooklyn N Y
- Quinones, Salvador CE '21-----34 Roble St Rio Piedras P R
Civil Engr Mayaguez P R
- Quinton, Alfred B Jr CE '12-----Washington D C
Major U S A Ord Dept Off Chief of Ord
- Quisumbing, Emilio AB CE '08 MP1E&A 1020 S Andres St
c/o City Engineer Manila P I
- Radford, Charles F CE '15-----Hermansville Mich
Civil Engr State Hwy Dept Menominee Mich
- Radueznier, Joseph CE '21-----
Jun Asst Engr N Y State Hwy Dept Hornell N Y
- Ragland, Edmond U BS CE '14 228 W Fisher St Salisbury NC
c/o Central Supply Co Little Rock Ark
- Ramage, William C H CE '10-----307 Cline St Girard O
- Ramirez, Reinaldo CE '16-----Cabo-Rojos P R
Asst Engr Isabela Irrig Serv Quebradillas P R
- Ramsay, James H BSc CE '13-----75 Hogarth St Toronto Can
- Randolph, Alfred M CE '14-----8 E Preston St Baltimore Md
Bartlett Hayward Co
- Rapp, George W Jr CE '16-----1337 Chapel St Cincinnati O
c/o L D Drewry & Co 501 Mercantile Library Bldg
- Rasbach, D Bennett CE '12-----502 W German St Herkimer N Y
Mem D C & C L Wood Civil Engrs and Surveyors
- Rasch, Charles J CE '10-----AMASCE 2846 Guilford Ave Balti-
Eng Geo A Fuller Co 707 Amer Bldg [more Md]
- Rauh, Charles E Jr CE '22-----207 Central Ave W Hoboken N J
Job Accountant Turner Constr Co of N Y Buffalo N Y
- Rayfield, Frederick H CE '15-----2 Peachtree Pl Atlanta Ga
- Raymond, Arthur A CE '15 MAAE 136 Norwalk Ave Buffalo
Dist Engr 304 Security Bldg Kansas City Mo [N Y]
- Raynor, Leroy P CE '17-----AMASCE Riverhead N Y
H & G Eng U S C & G S Southport N C
- Read, Jesse E CE '81-----448 Kosciusko St Brooklyn N Y
Asst Engr Finance Dept Municipal Bldg N Y C
- Read, Willett W CE '88-----714 Chilton Ave Niagara Falls N Y
Pres Read Coddington Engrg Co 238 Portage Road
- Reardon, Nyc B CE '05-----466 Guy St Montreal P Q Can
Asst Engr of Buildings Canadian Pacific Ry
- Reck, William M CE '14-----416 54th St Brooklyn N Y
Sales Mgr Kalman Steel Co City Bank Bldg Syracuse N Y
- Redwood, John P CE '17-----Bay Pond N Y
Res Engr Hopkins & Field Wilson N Y
- Reed, James W CE '83-----91 Forest Ave Glen Ridge N J
Asst Engr Bd of Est & Apportionment Mun Bldg N Y C
- Reese, Charles E CE '20-----402 Clark St Westfield N J
Jun Asst Engr N Y State Hwy Comm Norwich N Y
- Regan, Francis A CE '21-----966 74th St Brooklyn N Y
c/o White Construction Co New York City
- Regula, Albert S CE '14-----168 Clinton Ave Jersey City N J
Dist Chief Engr Liberty Ins Co 30 E 42d St N Y C
- Reilly, Albert R CE '14-----136 Park Ave Watertown N Y
c/o Eastman Kodak Co Kodak Park Rochester N Y
- Reiter, Arthur P CE '10-----3 S Grove St E Orange N J
Life Ins Metropolitan Life Insurance Co
- Reitze, Chester N CE '05-----MASCE MASTM Seattle Wash
Pac Coast Mgr Portland Cement Assn 803 Seaboard Bldg
- Rekate, George H CE '07-----130 Central Ave Lancaster N Y
Automobiles & Farm Machinery
- Remsen, Peter CE '12 AMASCE 3609 131st St N W Washing-
Engr John J Earley 3829 32d St Mt Rainer Md [ton D C]
- Remy, Jorge F EM CE '07-----Pisco Peru
Manager Pisco-Ten R R
- Reppert, Charles M CE '04-----MASCE 5538 Bartlett St
Brown & Reppert Inc Cons Engrs 407 Commonwealth Bldg
Pittsburgh Pa
- Requardt, Gustave J CE '09-----AMASCE 704 Cathedral St
Civil & San Engr 615 Munsey Bldg Baltimore Md
- Reynolds, William W CE '06 351 S Third Ave Mt Vernon NY
- Rhodes, Leland S CE '11-----
Asst Prof C E Pa State Coll State College Pa
- Rhodes, O Lynn CE '09-----205 W Madison St Baltimore Md
- Rhynns, Clarence P CE '11 AMASCE 16 Forbus St Pough-
Roxboro N C [keepsie N Y]
- Rice, John H CE '07-----194 Main St North Adams Mass
Contractor Cannon City Colo
- Rich, Melvin S CE '05-----MASCE 1448 Harvard St N W
Cons Str Engr 1410 H St N W Washington D C
- Rickard, Grover E AB CE '16-----MAPHA 121 N Claybrook St
Engr Analyst Artesian Water Dept Memphis Tenn
- Rickard, LeRoy S CE '06-----MAAE Cobleskill N Y
Asst Engr N Y S Comm of Highways R D I Mechanics-
ville N Y
- Rider, Arthur B CE '98-----Rhinelanders Wis
Supt of Constr U S Public Buildings
- Ridgway, Herbert CE '15-----AMASCE 819 Haddon Ave Cam-
Desur Am Bridge Co 30 Church St N Y C [den N J]
- Riegel, Ross M CE '04-----MASCE New Cumberland Pa
Hydr Engr W Penn Power Co 14 Wood St Pittsburgh Pa
- Riess, Oscar BE CE '09 MLAES 1423 Milan St New Orleans
Civil Engr & Contr 503 Hibernia Bldg [La]
- Riker, I Russell CE '15 MAPHA Box 154 Lawrenceville N J
San Engr State House Trenton N J
- Riley, John H T CE '09-----262 Remsen St Cohoes N Y
414 N Third St Philadelphia Pa
- Riley, John P CE '22-----59 Westminster St Bellows Falls Vt
Asst Engr Parklap Constr Co Glens Falls N Y
- Rindsfoos, Charles S CE '06-----MASCE 126 E 19th St
Seey-Treas Jarrett Chambers Co 30 E 42d St N Y C
- Ripley, John W CE '93-----MASCE Flushing N Y
V-P & Treas The Robbins Ripley Co 50 Church St N Y C
- Ritter, Gilbert P CE '97-----1326 Fairmont St N W
Atty at Law (Patents) McGill Bldg Washington D C
- Robartes, Leigh CE '09-----111 Jones Ave Port Jefferson N Y
Civil and Industrial Engineer
- Roberts, Alan Y CE '22-----110 Willow Ave Takoma Park D C
Jun Asst Engr N Y State Hwy Comm Hornell N Y
- Roberts, Fred W CE '17-----1471 High St Denver Colo
Highway Constr 206 Tramway Bldg
- Robey, Kennerly AM CE '95 1420 Boulevard Fort Worth Tex
Consulting Engineer and Geologist
- Robinson, Donald M CE '19 448 S Columbus Ave Mt Vernon
c/o Morrison Mills Bldg San Francisco Calif [N Y]
- Robinson, George G CE '14-----Weedsport N Y
Engr Jno E Russell Co Ltd 504 Harbour Admin Bldg
Toronto Ont Can
- Robinson, Horace B Sr CE '74-----304 Orange St Oil City Pa
Retired
- Robinson, Horace B Jr CE '10 1204 Crawford St Houston Tex
Civil Engr Cumberland Pipe Line Co
- Robinson, Melville W CE '15-----Winchester Ky
Civil Engr Cumberland Pipe Line Co
- Rockwell, Fayette L CE '14-----392 N Main St Wellsville N Y
Vice-Pres & Treas Victor Aluminum Mfg Co
- Rodenhiser, Louis A AB CE '14-----MAAE Warner N Y
Irrigation Co Box 626 Iowa Park Tex
- Rodhouse, Thomas J BS in CE MCE '05 MSPEE 819 Virginia
Prof Hydr Engrg Univ of Missouri Columbia Mo [Ave]
- Rodriguez, Arturo CE '91-----MASCE 308 W Seneca St Ithaca
Cons and Contrng Engr Box 142 San Juan P R [N Y]
- Rodriguez, Francisco de P CE '78 51 Virtudes St Havana
Lighthouse Engineer Board of Public Works [Cuba]
- Roess, Gustav F CE '90-----309 W Third St Oil City Pa
General Contractor and Engineer
- Rogde, Sigurd CE '19-----892 Union St Brooklyn N Y
- Rogers, Alson CE '72-----MESPA 120 Pa Ave W Warren Pa
Borough Engineer
- Rogers, Job R CE '06-----MRoES Holley N Y
Engineer & Contractor 63 S Main St
- Rogers, Theodore C CE '16-----
Tel Engr Am Tel & Tel Co 195 Broadway N Y C
- Rohrer, Carl H CE '13-----Ft Collins Colo
Irrigation Engr U S Dept Agr Experiment Sta
- Rollow, Thomas P Jr CE '09-----MAAE 419 W Henderson St
Asst Div Engr GC&SF Ry Cleburne Tex
- Root, Francis J CE '73-----600 West End Ave N Y C
Pres New York Wire Cloth Co 233 Broadway
- Rose, John K Jr CE '15-----Provident Natl Bank Bldg Waco Tex
Civil Engr c/o Tropical Oil Co Barranca Bermeja Col-
ombia S A
- Rosenfeld, James R CE '15-----1433 Inverness St
951 Penn Ave Pittsburgh Pa
- Rosenthal, Jules E CE '15-----Douglas Manor N Y
V-P. Commonwealth Engr Corp 103 Park Ave N Y C
- Rosenzweig, Samuel CE '15-----809 H St N W
[Washington D C]
- Rosser, David M CE '95-----R D I Berwick Pa
Engr Rds and Bridges Luzerne Co Court House Wilkes-
Barre Pa
- Rossmann, Clark G CE '93 MD-----339 Allen St Hudson N Y
Physician and Surgeon 11 S Sixth St
- Rounds, Donald M CE '03-----708 Sixteenth St Des Moines Ia
County Engr Geary Co Kan Junction City Kan
- Rountree, Albert C BS in CE CE '12-----Quitman Ga
County Engineer
- Routh, James W CE '14-----AMASCE St Paul Minn
Cons Engr Bur of Mun Research Athletic Club Bldg

- Rue, Malcom A CE '99--AMASCE R F D 3 Now Brunswick
American Steel Co 49 Linea Vedado Havana Cuba [N J]
- Ruhl, David A CE '20-----3707 Grand Ave Des Moines Ia
2-4-6 Seventh St
- Ruiz, Henry C (See Williams, E Ruiz) -----
- Rummele, Edward T CE '14-----Manitowoc Wis
Jeweler
- Rumsey, Austin L CE '23-----Cato N Y
- Runnette, Harry K CE '96-----2231 Dexter St Denver Colo
Civil Engineer
- Russell, Robert C CE '17--4158 Cleveland Ave St Louis Mo
Engr Corrugated Bar Co 20 W Jackson Blvd Chicago Ill
- Rutherford, Harry W CE '06-----Apt 609 1021 Pine St
Civil Engr 647 New York Bldg Seattle Wash
- Rutledge, Arthur E CE '86--808 N Church St Rockford Ill
Contractor Mead Building
- Ryan, Walter J AB CE '06--MASCE Snoqualmie Falls Wash
Civil Engineer Weyerhaeuser Timber Co
- Ryman, Lynde H CE '13--183 N Laurel St Hazleton Pa
Asst Engr L V R R Div Engineer's Off Sayre Pa
- Ryon, Henry CE '06 AMASCE 626 Flatbush Ave Brooklyn
Asst Engr State Engrs Off Albany N Y [N Y]
- St John, Richard C CE '87-----466 Lexington Ave N Y C
496 Broadway Albany N Y
- Sagol, Marcus CE '21--MAAE 1815 Linden Ave Baltimore Md
Res Engr Div of Hwy Box 591 Pittsfield Ill
- Sanders, Daniel H CE '09 191 Forest Ave Tompkinsville N Y
Asst Engr N Y C R R New York City
- Sanderson, Albert B Jr CE '16--32 Westford Ave Springfield
Sales Engr Pittsburgh-Des Moines Steel Co [Mass
Pittsburgh Pa]
- Sarstedt, Gordon A CE '15-----MCIES 2895 Weymouth Rd
Sec-Treas Genl Asphalt Pav Co & Cleve [Shaker Hts O
Wax Paper Co Cleveland O]
- Saunders, Walter L CE '17--MACI 4139 New Hampshire Ave
Dist Engr Conc Steel Co Woodward Bldg Washington D C
- Savacool, William L CE '04-----74 Ray St Jamaica N Y
Civil Engineer and Surveyor Elmhurst N Y
- Sawyer, Thorp D CE '14--AMASCE c/o Mrs W P Tron-
[bridge R D 1 Tacoma Wash
Bennitt & Sawyer Casilla 706 LaPaz Bolivia S A]
- Saxton, Wilbur S CE '07-----Baldwinsville N Y
Assistant Engineer New York State
- Seacciaferro, Salvator J CE '21--JASCE 506 Highland Ave
Civil & Sanitary Engineer Clifton N J
- Searrirt, Winthrop T CE '13-----733 Pleasant St Utica N Y
Secy Pratt Chuck Co Frankfort N Y
- Schaefer, John J CE '21 116 Lincoln Ave Rockville Centre
Supt of Constr Long Beach Natl Bank Long Beach N Y [N Y]
- Schaefer, Rudolph F CE '10--8930 118th St Richmond Hill
Structural Designer 120 Broadway N Y C [N Y]
- Schaetzle, Theodore C CE '13-----37 Ruekert Ave
Prin San Chemist Sewerage Works Baltimore Md
- Scheckel, William B CE '17 943 St Johns Place Brooklyn N Y
- Scheidenhelm, Fred W AB '05 CE '06 MASCE 10944 Hilburn
Cons Engr Mead & Scheidenhelm Suite [St Hollis N Y
2025 30 Church St New York City]
- Schein, Nathan CE '06-----AMASCE 1510 Carson St
Div Engr Bur of Engrg Pittsburgh Pa
- Schempf, Robert CE '20-----423 E 86th St New York City
With Jobson-Gifford Co 30 E 42d St
- Schindler, Harry CE '14-----
- Schirmer, Gustav CE '11-----MASME 3839 Gladys Ave
Sales Engineer 570 Penobscot Bldg [Chicago Ill
Detroit Mich]
- Schmeck, Henry P CE '11--7904 St Charles Ave N Orleans La
- Schmidt, Elmer E F CE '12-----MASME 3613 Lemon Ave
Genl Supt Lone Star Gas Co Dallas Tex
- Schmidt, Margaret V CE '22-----1346 Prospect Ave N Y C
c/o N Y Tel Co 172 Fulton St
- Schmied, Erich E CE '15-----224 Aisquith St Baltimore Md
Mgr Fred B Young & Sons Constr Memphis Tenn
- Schoder, Ernest W BS PhD '03--AMASCE 220 Willard Ave
Prof of Hydr School of Civil Engrg C U Ithaca N Y
- Scholtz, Herman F BCE CE '06 AMASCE 1430 Cherokee Rd
Asst Genl Mgr The McCrone Co Inc [Louisville Ky
Bangkok Siam]
- Schreiber, Leonard G CE '05-----626 June St Cincinnati O
Manufacturer Box 18 Evanston Sta
- Schreiner, Alberto F CE '97-----MMunENY New York City
Efficiency Engr Comm of Accounts 2500 Municipal Bldg
- Schreiner, Frederick O CE '22-----Johnsonburg Pa
c/o Ill C RR 1201 S Michigan Ave Chicago Ill
- Schroeter, Robert H CE '20-----417 E Center St Marion O
150 W 76th St New York City
- Schwalbach, Frank CE '88-----R D 8 Appleton Wis
Civil Engineer
- Schwartz, Christian CE '14-----MSAE 71 W Willis Ave
Testing Engr Studebaker Corp [Detroit Mich]
- Schwartz, Samuel L CE '14-----2103 62d St Brooklyn N Y
Engr & Bldg Contr 80 Maiden Lane N Y C
- Seileppi, Francis P CE '17--95 Corona Ave Elmhurst N Y
Appr McClintic-Marshall Constr Co YMCA Pottstown Pa
- Scott, Burton A CE '23-----1759 Lysander St Detroit Mich
Jun Engr U S Bur of Pub Roads Washington D C
- Scott, Earle N CE '23-----1759 Lysander St Detroit Mich
- Scott, Owen W CE '23-----1759 Lysander St Detroit Mich
Bridge Dept State Hwy Comm Lansing Mich
- Scruggs, Edward D CE '23-----Brewton Ala
- Seagrave, Clarence N CE '12-----Gooding Ida
Distributor Presto O Lite Batteries
- Seaman, Daniel H CE '08 AMASCE 17 Demarest St Newark
Str Engr D Everett Waid 1 Madison Ave N Y C [N J]
- Seaman, Van Brunt CE '20-----12 Fisk Pl Brooklyn N Y
- See, Russell A BS in CE MCE '14--Montgomery City Mo
Asst Engr U S Reclamation Service Morrill Neb
- Seely, Henry A CE '07-----
1107 Tremont Bldg Boston Mass
- Seely, Homer R CE '19-----1519 Green St Harrisburg Pa
Res Engr Bethlehem Steel Bridge Corp Steelton Pa
- Seelye, Elwyn E CE '04-----MASCE
Cons Engr 101 Park Ave New York City
- Seifried, Charles F CE '09-----2820 Reed St Cheyenne Wyo
Chief Draftsman Wyoming State Hwy Comm
- Seipp, Clarence T CE '09--2340 Lincoln Park W Chicago Ill
- Seipp & Lonergan 179 W Washington St
- Selby, Frank S CE '13-----MACHemS 1806 Dodge St
Real Estate & Insurance Omaha Neb
- Selee, Richardson CE '21--MASMile 43 Prospect St Dover NJ
1st Lieut Engrs U S A Fort Humphreys Va
- Sellstrom, Elmer W CE '07-----MSAE 611 Jefferson St
Supt Dahlstrom Metallic Door Co Jamestown N Y
- de Sena, Luis AB CE '08 MCuSE Calle 13 esq a 6 altos
Real 110 Marianao Cuba [Vedado]
- Senior, Frank S CE '96--MAAE MASCE Montgomery N Y
Vice-Pres Arthur McMullen Co
- Sessler, Marcel K CE '13--Gedney Farm Hotel White Plains
Pres Amer Spike Co Inc 60 Broadway N Y C [N Y]
- Severson, Oscar M CE '01-----AMASCE Belfast N Y
Constructing & Contracting Engineer
- Sewell, Oscar J CE '19-----Olive Hill Ky
Asst Engr Div of Hwys Box 233 Red Bend Ill
- Sexton, Joseph M CE '15-----169 W 98th St New York City
- Shae, Shao-Ying D CE '10--AMASCE Ssuningkai Man China
Mngg Dir Ssuningkai-Taonan-Line
- Shafer, James C F CE '05--AMASCE 1740 Page Ave E
Constructor 400 Erie Bldg Cleveland O
- Shaner, George F CE '22-----110 York St Pottstown Pa
- Shanklin, George R CE '22-----Ensenada P R
Asst Engr W I Finance Corp La Romana Santa Domingo
- Shar, Chuan Shou MCE '22--MAREMA MAWPA 4 Hsin Yeh
Engr Chinese Govt Rys Shanghai China [Lane]
- Shaw, Walter K CE '13--87 Fairview Ave Nepperhan N Y
Asst Secy Turner Constr Co 244 Madison Ave N Y C
- Shelton, Murray N CE '16--617 Central Ave Dunkirk N Y
Highway Contractor
- Shen, Moo T CE '11 MCE '12-----Nanking China
Dean Nanking School Rys & Mines New Range Road
- Sherk, Earl J CE '21-----1849 Regina St Harrisburg Pa
Engr North Penn Power Co Blossburg Pa
- Sherman, Charles W SB MCE '95 MAWWA MASCE Bel-
Mem Firm Metcalf & Eddy 14 Beacon St [mont Mass
Boston Mass]
- Sherman, Walter J CE '77 MAAE MASCE 2243 Scottwood
Cons Engr 302 Produce Exch Bldg Toledo O [Ave]
- Sherwood, Nial CE '08-----AMASCE Liberty N Y
Civil Engineer
- Sherwood, Wakeman F CE '13 27 Murray St Binghamton N Y
Draftsman Erie R R Co 50 Church St N Y C
- Shing, Shao C CE '17-----Chengtu Szechuan China
- Shipman, Linn D CE '14-----335 Halsey St Brooklyn N Y
Agency Mgr Salesman Safe Cabinet Co 90 Livingston St
- Shipman, Samuel S CE '19-----229 E 26th St Brooklyn N Y
Estimator 37 S Ninth St
- Shire, Moses E CE '00-----Highland Park Ill
Secy A G Becker & Co 137 S LaSalle St Chicago Ill
- Shirey, Lacy L CE '20-----JASCE Union W Va
2329 N Delaware St Indianapolis Ind
- Shreve, Ralph F CE '06-----8241 Wilson Ave Detroit Mich
Str Engr Power & Constr Dept Ford Motor Co
- Shumway, Arthur K CE '04--44 Electric Ave Rochester N Y
Alexander Shumway & Utz Co Contrs 16 State St
- Siegfried, Cyrus S CE '23-----6 N Pearl St Buffalo N Y
- Sieling, Louis J CE '07 AMASCE 211 Broad St Red Bank
Engrg Contr Second Nat Bank Bldg [N J]

- Silsbee, James A CE '07 AMASCE 913 W Water St Elmira
Pres Silsbee Trucking Corp 234 48th St Brooklyn N Y [N Y
- Silverman, Aaron CE '02 1501 N Bentalon St Baltimore Md
Secy Silverman & Bonslo Clothing Mfrs 1222 W Balto St
Ds Silveira, Fernando X CE '96 Monte Santo Minas Brazil
- Simpson, Robert H CE '96 1748 Summit St Columbus O
Chief Engr Dept Public Service City Hall
- Sines, Bernard S CE '22 308 S Fiftieth St Omaha Neb
e/o Ill Cent Ry 1201 S Michigan Ave Chicago Ill
- Siseo, Spencer E Jr CE '23 216 Hawthorne Rd
[Baltimore Md
- Cadet Engr Pub Serv Production Co Newark N J
- Skinner, Frank W CE '79 MASCE 84 Hendricks Ave New
Cons Engr 243 W 39th St N Y C [Brighton N Y
- Skinner, John A CE '01 946 Greyton Road Cleveland O
Asst Engr Val Dept N Y C R R Crown Bldg
- Skinner, John F CE '90 MASCE 21 Arnold Park Rochester
Cons Engr & Deputy City Engr 56 City Hall [N Y
- Slack, Thomas A CE '22 1516 W Terrell Ave Fort Worth Tex
Water Resources Br U S G S Pecos Tex
- Slater, Joseph N CE '03 638 Ellicott Sq Buffalo N Y
- Sloane, George G CE '12 1733 T St N W Washington D C
- Sloat, John A CE '08 Clyde N Y
Sloat & Sloat Autos & Farm Machinery
- Smallman, Ralph A CE '08 MCE '09 AMASCE Terrace
Vice-Pres & Treas Smallman Court Apt Birmingham Ala
- Brice Constr Co Inc 1109 Ave E
- Smith, Alger J CE '20 Reynolds Ave Corning N Y
Draftsman Amer Bridge Co Elmira N Y
- Smith, Arthur L CE '11 MAAE Holland N Y
Div Engr State Highway Dept Selma Ala
- Smith, Benjamin L CE '14 AMASCE Baltimore Md
Cons Engr Norton Bird & Whitman 615 Munsey Bldg
- Smith, Cameron J W CE '22 7 Hillside Ave New Hartford
[N Y
- Smith, Charles E CE '13 313 E King St York Pa
- Smith, Dietz A CE '13 313 E King St York Pa
James Lefell & Co Springfield O
- Smith, Eugene L CE '12 444 Marine Trust Bldg Buffalo N Y
- Smith, Eugene R CE '77 MASCE Islip N Y
Civil Engineer & President First National Bank
- Smith, George G CE '98 MCE '99 Algerine St Stanley N Y
Farmer
- Smith, Harry C CE '07 150 Greenwood St Canisteo N Y
Civil Engr Seneca Falls N Y
- Smith, Henry E CE '06 644 Maryland Ave Bellevue Pa
- Smith, John W BArch CE '12 1500 Park Ave Baltimore Md
631 N Tyndall Ave Tucson Ariz
- Smith, Joseph E CE '20 818 Cleveland St Durham N C
Mfrs Agent 608 First Nail Bank Bldg
- Smith, Lawrence R CE '07 350 Tremont St N Tonawanda
Mgr Wholesale Dept Ray H Bennett Lumber Co [N Y
- Smith, Leonard J CE '92 MECIPh 2430 Fairmont Ave
Div Engr Phila Rapid Transit Co Philadelphia Pa
- Smith, Marion deK Jr AB CE '01 AMASCE 6 Washington
[Ave Chestertown Md
- Smith, Miller A CE '71 MASCE 235 Lincoln Rd Brooklyn N Y
Consulting Engineer
- Smith, Stephen H CE '13 Sherburne N Y
Chief Engr I W Jones & Co Milton N H
- Smith, Theodore L CE '16 49 Meyers St Forty Fort Pa
Tel Engr AT&T Co 195 Broadway New York City
- Smith, William C CE '85 434 W 15th Ave Spokane Wnsh
- Smook, Joseph M CE '20 JASCE 76 Cannon St N Y C
Jun Engr U S C & G S Washington D C
- Sneckenberger, Earl M PhB CE '05 Billings Mont
City Engineer City Hall
- Snider, Clarence A CE '91 MASCE MASME
[100 Montgomery Circle New Rochelle N Y
Pres Sulphur Export Corp and Secy Treas The Union
Sulphur Co 33 Rector St N Y C
- Snively, William J CE '16 202 Jackson St Janesville Wis
- Snow, Arch M CE '06 2 Park St Malone N Y
Engineer Court House
- Snyder, Charles H CE '02 AMASCE 324 West Ave
Civil Engr Monarch Engrg Co 62 Barton St Buffalo N Y
- Snyder, Howard H CE '13 AMASCE 393 Parkside Ave
[Brooklyn N Y
- Cons Engr Ball & Snyder 19 E 24th St N Y C
- Sobel, Julius CE '16 MAAE 702 Eastern Pky Brooklyn N Y
Sales Dept Ames Emeric & Co 111 Broadway N Y C
- Soloway, Lawrence CE '23 Hotel Shelbourne Lakewood N J
- Soman, Philip E CE '17 500 W 174th St New York City
Real Estate & Bldg 152 W 42d St
- Sorokin, Marcus CE '20 JASCE MAAE 69 Bolshay Sadovay
[Kostoff-on-Don Russia
- Sourwine, James A CE '12 The Mount Cedar Rd Baltimore Md
- Souza, Antonio C P CE '14 Rua Helvetia 31 Sao Paulo
Railway Engineer [Brazil
- Spalding, Lawrence CE '13 MAREA MARB&BA Box 243
Asst Val Engr Bess & Lake Erie R R Greenville Pa
- Spamer, Morris A CE '13 929 1/2 Oak Hill Ave Hagerstown
Manager Joseph Brenner & Co Barksdale, Wis [Md
- Spandau, Harry M CE '09 MCE '10 MAAAS 35 Eighth St
[Ridgefield Park N J
- Aet Lybrand Ross Bros & Montgomery 110 William St
N Y C
- Sparfield, Emil H CE '12 175 St James Pl Buffalo N Y
Asst Prod Mgr American Chain Co Bridgeport Conn
- Spear, George P Jr CE '16 143 Gregory Ave Passaic N J
Engr N Y Tel Co 104 Broad St N Y C
- Specht, Harry G CE '13 335 E 68th St New York City
Ind Engr Bessick Co Bridgeport Conn
- Spelman, Harold J CE '10 MAAE AMASCE Huntington W
Div Engr State Road Comm 107 Robson Priehard Bldg [Va
- Spelman, William A CE '08 Champlain N Y
38 Barclay St New York City
- Spence, Thomas R CE '17 e/o State Hwy Dept Austin Tex
Div Engr State Hwy Dept Cham of Comm San Antonio Tex
- Spencer, Clifton B CE '94 528 Moffet Ave Joplin Mo
Val Engr St Louis-San Francisco Ry St Louis Mo
- Speyer, Elwin G CE '07 MASCE 1509 Seneca St
Cons Engr 801 Chamber of Commerce Buffalo N Y
- Spiker, William C CE '00 MASCE MAAAS
Cons Engr Spiker & Lose 520 Forsyth Bldg Atlanta Ga
- Spivak, William CE '20 JASCE 194 Thaford Ave Brooklyn
[N Y
- Spivey, Willis T BS in CE CE '10 Greenville Ga
Mat Handling Engr W T Spivey & Co 112 S 16th St
Philadelphia Pa
- Spragins, William E CE '08 Univ Club Salt Lake City Utah
Wholesale Stove & Range Bus 702 Walker Bank Bldg
- Sprague, Danley D CE '95 MAAE Holley N Y
Sen Str Engr Val Dept I C C 1901 D St Wash D C
- Sprague, Frank D CE '11 e/o F J Sprague 421 Canal St NYC
- Spragg, C Crawford CE '07 AMASCE 15 Central Ave St
Pres Gen Contrg & Engrg Co [George Staten Isd N Y
- 40 Rector St New York City
- Spurney, Felix E CE '23 802 Second Ave Astoria N Y
Turner Constr Co 244 Madison Ave New York City
- Squire, Walter L CE '10 2902 Lewiston Road
Niagara Falls Power Co Niagara Falls N Y
- Stahl, John J CE '12 315 Manning Blvd Albany N Y
Turbine Engr Dept Genl Elect Co Schenectady N Y
- Stallfort, J Alfred CE '10 AMASCE MECIMd 3217 Carlisle
Gen Mgr Bldg Dept Consol Engrg Co 243-59 [Ave
Calvert Bldg Baltimore Md
- Stalker, John H CE '20 9 James St Montclair N J
Str Desnr Power Constr Co 35 Harvard St Worcester Mass
- Standiford, Harry R CE '10 AMASCE 1229 L St N W Wash
841 Broadway New York City [D C
- Stanton, Grove A CE '07 226 1/2 State St Auburn N Y
- Stanton, Robert B Jr CE '09 AMASME
Sales Engr Vacuum Oil Co Alexandria Egypt
- Stapley, Edward R CE '14 32 Oak St Geneseo N Y
Secretary Geneseo Auto Co
- Starkweather, Alfred K CE '12 80 Farrington St Caldwell
Engineer N Y Tel Co 15 Dey St N Y C [N J
- Starr, Charles F CE '15 MREES 147 Penhurst St
Chief Engr Geneseo Bridge Co Inc Rochester N Y
- Stearns, Fred L CE '10 AMASCE Norwich Conn
Asst Engr Am Bridge Co 30 Church St N Y C
- Stearns, John CE '06 AMASCE 446 Ocean Ave Brooklyn N Y
Constr Supvr J G White Engrg Corp 43 Exch Pl N Y C
- Stebbins, Smith H CE '95 590 E 19th St Brooklyn N Y
Assistant Chief Map Division Hall of Records
- Steel, Ernest W CE '20 Navasota Tex
San Engr State Health Dept Austin Tex
- Steele, Gilbert V CE '10 245 State St Flushing N Y
With Abbott Merkt & Co 175 Fifth Ave N Y C
- Stegner, Clifford M BS CE '00 MASCE MAIA
Stegner & Hughes Archs & Engrs 1700 Union Trust Bldg
Cincinnati O
- Stein, Myer CE '17 508 Elton St Brooklyn N Y
- Steinacher, Gustavo J CE '92 9 W 91st St N Y C
Chief Engr Dept of Parks Mun Bldg
- Steljes, Martin CE '15 29 Hill St New Rochelle N Y
Aetg Chief Engr Concrete Steel Co 42 Broadway N Y C
- Sterling, Guy CE '87 MASCE 1543 E Ninth South St
Cons Engr 630 Clift Bldg Salt Lake City Utah
- Stern, Jeno CE '21 222 E 96th St New York City
- Stevens, John H CE '08 AMASCE
Asst Engr N Y State Hwy Comm Watertown N Y
- Stevenson, Albert L CE '13 AMASCE
Desng Engr E E Seelye Cons Engr 101 Park Ave N Y C
- Stewart, Charles G BS CE '12 MAAE Box 612 Flora Ill
Asst Div Engr Ill Div B & O R R

- Stewart, Clinton B CE '90-----AMASCE MWSe
Cons Hydr Engr 2321 Rowley Ave Madison Wis
- Stewart, David B Jr CE '09 2601 N Charles St Baltimore Md
Asst Supt Raymond Conc Pile Co Sparrows Pt Md
- Stewart, Walter P CE '07-----312 E 34th Portland Ore
Asst Adm Off Alexander Hamilton Inst 13 Astor Pl NYC
- Stibalt, Victor A CE '11-----532 W Seventh St Davenport Ia
Natalbany Lumber Co Ltd Hammond Ia
- Stidham, Harrison CE '91 AMASCE MWSe 3322 Newark
Cons Engr Wilkins Bldg Washington D C [St
- Stine, Charles R CE '96-----
Stirling, Vincent R CE '05-----851 S Wilton Pl Los Angeles
[Calif
- Stockdale, Thomas R CE '07-----Memphis Tenn
Civ Engr with Gardner & Howe 76 Porter Bldg
- Stolz, Albert F CE '19-----500 Wilnac Bldg Minneapolis Minn
Secy Merchants Life & Casualty Co
- Stone, Don O CE '09-----1095 Elmwood Ave Columbus O
Secy & Treas The Crowell & Stone Co Bituminous Contrs
452 S Pearl St
- Stone, Edward C CE '02-----Route 2 Box 30 Gardena Calif
Salesman Ward Davis & Dunn Brokers
- Stone, George C CE '11-----AMASCE Altavista Va
Genl Mgr Altavista Light & Power Corp
- Stone, James S CE '89-----516 Grimes St Sewickly Pa
Checker Amer Bridge Co Anbridge Pa
- Stone, Morris CE '15-----38 Lincoln Ave Amsterdam N Y
Stone's Toggery Shops
- Storey, Frank S CE '02-----AMASCE
e/o The Phoenix Constr Co 41 Park Row New York City
- Storey, William R CE '81-----MROES 30 Mortense St Rochester
Civil Engr and Surv 510 Ellwanger & Barry Bldg [N Y
- Storz, Joseph F CE '06-----35 Wyoming St Wilkes-Barre Pa
Maintenance of Way Dept Lehigh Valley Railroad
- Stott, Charles A CE '19-----3164 17th St Washington D C
Clerk Chas G Stott & Co Inc Paper & Stationery
- Strahan, Joseph C J CE '13-----210 W 90th St New York City
- Strang, Percival CE '07-----Chicago Ill
Genl Supt The Dunn McCarthy Co 520 Old Colony Bldg
- Strasburger, Edgar J CE '00-----MAAE 303 S Idaho St Butte
Strasburger Civil and Mining Engrg Co [Mont
- Stratton, William H CE '88 194 Prospect St Ridgewood N Y
Mgr Br and Bldg Dept U S Steel Prod Co 30 Church St
N Y C
- Strong, Herbert W CE '94-----1939 E 90th St Cleveland O
Secy The Strong Carlisle & Hammond Co 1392 W Third St
- Strumer, Samuel CE '17-----1384 Bristow St N Y C
Fouquor Concrete Co 29 Broadway
- Stuart, Thomas M CE '15-----149 Sumner Ave Springfield Mass
Indl Engr Tolhurst Machine Works Troy N Y
- Stubbs, James H CE '76-----Fort Morgan Colo
Civil Engineer
- Sturdevant, James H CE '05-----AMASCE Poughkeepsie N Y
Div Engr N Y State Hwy Comm
- Sullivan, John G CE '88 MASCE MEIC MAREA 207 Har-
Cons Engr 703 McIntyre Bldg Winnipeg [Ivrd Ave
- Manitoba Can
- Sullivan, Michael G CE '21-----334 Garson Ave Rochester N Y
Jun Engr N Y State Hwy Comm Buffalo N Y
- Sullivan, Philip L CE '18-----1 Loring Hall Springfield Mass
Maintenance of Way Dept L V R R Buffalo N Y
- Summers, Richard E J CE '14 AMASCE 508 McNair Ave
Asst Chief Engr H K Ferguson Co Cleve- [Wilksburg Pa
- land O
- Summers, William F CE '14-----144 Queen St Ithaca N Y
With Edward Sprigg Contr & Bldr
- Sun, Taoyuh C CE '09-----AMASCE 15 Peking Rd Shanghai
Managing Director Chuchow-Chinchow Ry Tur-farr [China
- Hutung Peking China
- Sun, Yu-fong CE '18-----JASCE 2 Taku St Tientsin China
Seet Engr Peking-Suiyuan Ry Pintiehuan Sta
- Sundstrom, Charles A Jr CE '21 176 Wisner Ave Middletown
[N Y
- Asst Engr with Hopkins & Field of Roch N Y Cuba N Y
- Super, Stanley L CE '12-----7 S Sixth St Pottsville Pa
Civil Engineer East Penn Rys
- Supplee, George W CE '15-----Haddon Heights N J
Supt Ore Docks P & R Ry 2821 Richmond St Phila Pa
- Sutton, Paul B CE '12-----818 Academy St Watertown N Y
City Engineer
- Swanitz, Henry W CE '00-----AMASCE 1210 Eighth Ave
Bldr Instr City Hall San Francisco Calif
- Swordlove, Louis CE '17-----MAAE 2463 Valentine Ave
Jun Engr Room 606 39 Whitehall St N Y C
- Swick, Charles H CE '10-----Livonia N Y
Capt'n USA 3d Engrs Schofield Barr Honolulu T H
- Swick, Clarence H CE '07-----MPhSWa Capitol Heights Md
Mathematician U S C & G S Washington D C
- Swindells, Joseph S CE '95 MCE '98 MASCE 1090 E 18th St
Cons Engr Rm 924 5 Beekman St N Y C [Brooklyn N Y
- Swinney, Robert E CE '08-----Kinston N C
With Union Paving Co of Philadelphia Pa
- Symonds, George R B CE '09 AMASCE MSAmE 39 Wayne
Town Engineer Nutley N J [Pl
- Tan, Vidal A AB MA '18 CE '18 469 Salsipuedes Manila P I
Civil Engr and Instr Univ of the Philippines
- Tang, Cheng Long CE '21-----Tang's Villa Kishup Hup Hupeh
[China
- Tang, Wen Ti BS MCE '23 39 Yen Yao Hutung Peking China
Draftsman Amer Bridge Co Pencoyd Pa
- Tate, Robert L H CE '12 MAAE AMASCE 219 Linden Ave
[Ithaca N Y
- Asst Engr A Burton Cohen 1 Madison Ave N Y C
- Taussig, J Wright CE '08-----AMASCE
Asst Genl Mgr Raymond Con Pile Co 140 Cedar St N Y C
- Tavares, Juan T CE '18-----Santiago Dominican Rep
Engineer Tavares Soes Builders
- Taylor, Albert M CE '15-----Athens Ave Ardmore Pa
- Taylor, Clinton L CE '12-----Box 644 Wyalusing Pa
Agriculture
- Taylor, Edward H BS CE '12 e/o C & P Tel Co Roanoke Va
Engr Lockwood Greene & Co 1566 Hanna Bldg Cleveland O
- Taylor, Robert C CE '99-----620 Mellon St Pittsburgh Pa
Supt Lucy Furnaces Carnegie Steel Co
- Taylor, Roy CE '10-----455 Greene Ave Brooklyn N Y
Munson Steamship Co 82 Beaver St N Y C
- Taylor, Royden J BE CE '03-----614 Wayne Ave Indiana Pa
Civil Engineer
- Taylor, S Leroy CE '13 3529 Columbus Ave Minneapolis Minn
Sen Hwy Engr U S Bur Pub Rds 410 Hamu Bldg St Paul
Minn
- Taylor, Thomas U CE MCE '95-----MASCE San Antonio Tex
Dean of Engrg Univ of Texas Austin Tex
- Taylor, T Walter CE '00 1424 W 35th St Oklahoma City Okla
Asst Genl Mgr Fortuna Oil Co 424 Lee Bldg
- Taylor, William R CE '03-----1257 Dean St Brooklyn N Y
Thos F Taylor's Sons Inc Coal 588 Kent Ave
- Tehan, Joseph J CE '09-----4 Sheridan St Auburn N Y
Assistant Engineer L V R R Co
- Tempest, Richard C CE '09 163 Albermarle Ave Rochester NY
Ten Hagen, Henry CE '13-----AMASCE High Falls N Y
Co Engr N Y State Hwy Comm Warsaw N Y
- Tenney, Maynard A CE '98-----1049 E 18th St Brooklyn N Y
Inspector Bureau of Water Philadelphia Pa
- Terrazas, Federico CE '16-----404 Victoria St Chihuahua Mex
- Terrell, Adelphus C CE '00-----Macon Mo
Div Engr on Val N P Ry St Paul Minn
- Tevonian, Hagop P CE '21-----Kasta Armenia
Draftsman Texas Oil Co 17 Battery Place N Y C
- Thacher, Cornelius S CE '78-----MAAAS Clifton Springs N Y
Professor Mathematics Retired
- Thatcher, Romeyn Y CE '09-----9 Frontenac Ave Buffalo N Y
Civil Engr Lackawanna Pl Beth Steel Co Lackawanna N Y
- Thebaud, John E CE '95-----
Engr and Patents 717 Lincoln Bldg Philadelphia Pa
- Thiele, Claude M CE '11-----1472 Kilbourne Pl Washington D C
Captain U S A C A O e/o Adj Gen
- Thomas, Edward J CE '15-----AMASCE 617 Warren St
Supt Constr Saginaw Products Co Saginaw Mich
- Thomas, Edwin R CE '09-----Prospect St S Dartmouth Mass
Treas & Genl Mgr Loeke & Thomas Genl Contrs New
Bedford Mass
- Thomas, James B CE '04-----Elyria O
Electric Alloys Co
- Thomas, Joseph A CE '20-----JASCE e/o Mrs B A Hoesfeld
Asst Engr Manila Electric Co [Clark's Summit Pa
- 134 San Marcelino Manila P I
- Thomas, Seymour P CE '72 30 Lenox Drive Greenwich Conn
Retired
- Thomas, William C CE '01-----210 Plummer Ave Emsworth Pa
Checker
- Thomassen, Victor G CE '11-----AMASCE 539 Madison St
[Brooklyn N Y
- Aetg Res Engr U S Steel Prods Co Buenos Aires Arg Rep SA
- Thompson, Alexander M CE '13-----5215 Second Ave S
[Minneapolis Minn
- Thompson, Chester A CE '16-----158 Dana Ave Albany N Y
e/o Seovell Wellington & Co Hanna Bldg Cleveland O
- Thompson, Elmer E Jr CE '11-----AMASCE 715 W Church St
American La France Fire Engine Co [Elmira N Y
- Thompson, Ewing CE '14-----305 Third Ave Lewiston Ida
- Thompson, George R CE '17-----41 Woolsey St Long Island City
- Thompson, Hoxie H BS CE '05-----Trinity Tex
President Thompson Bros Lumber Co
- Thompson, Karl F CE '14-----Sencea Falls N Y
Asst Engr N Y State Hwy Comm Hornell N Y
- Thompson, Robert W CE '22-----Corona N Y
e/o Turner Constr Co 244 Madison Ave N Y C

- Thompson, Wells N CE '21-----8 East St Adams Mass
Thoms, Joseph C Jr CE '22-----110 Macon St Brooklyn N Y
c/o Clyde Potts Civil & San Engr 30 Church St N Y C
Thomson, Alexander Jr CE '99-----MASCE 104 N 22d St
Dist Sales Mgr Cone Steel Co 42 [E Orange N J
Broadway N Y C
Throop, Henry G CE '05-----AMASCE 2117 S Geddes St
Supt for F J Baker Contr Syracuse N Y
Throop, William B CE '77-----Galesburg Ill
Retired
Thweatt, Hardin H CE '13-----1820 E 87th St Cleveland O
Ind Engr Van Dorn & Dutton Co
Tier, Lewis P CE '74-----1313 E 117th St N E Cleveland O
Car Dept N Y C R R Co Collinwood O
Tiffany, Nathan N CE '05 AMASCE East Hampton N Y
Civil Engineer & Surveyor
Tiffany, Nelson O Jr CE '01-----214 W Ferry St Buffalo N Y
Pres & Gen Mgr Masonic Life Assoc Masonic Temple
Tillotson, Edwin H CE '17-----130 E Elm St Rochester N Y
Bldg & Contrg 207 Amer Bank Bldg Pontiac Mich
Tilton, Benjamin CE '97-----MASCE MAREA 18 Mason Place
[Utica N Y
Vice-Pres N Y State Rys 303 Gridley Bldg Syracuse N Y
Ting, Zung-Kun MCE '20-----Kun-Shan Kiang-Su China
Todd, Clarence L CE '07-----AMASCE Pittsburgh Pa
Mgr Constr Pbgh-Des Moines Steel Co 807 Curry Bldg
Tolles, Frank C CE '05-----MASCE 265 S Columbus Ave Mt
c/o Swigart & Ehrman Engrs Akron O [Vernon N Y
Tomlinson, Frank C CE '74-----619 S Fourth St Ironton O
Tompkins, George S CE '96-----AMNFPA 10 Glengarry Win-
Supt Eastern Off Firemen's Fund Ins Co [Lechester Mass
20 Kilby St Boston Mass
Tompkins, Howard C CE '03-----Baltimore Md
Member of Firm R K Meade Co 13 E Fayette St
Toms, Raymond E CE '07-----2033 W 108th Pl Chicago Ill
Sen Hwy Engr U S Bur Pub Roads
Torrance, Chester C CE '99 MCE '00 MCuSE Industria 100
Torrance & Portal Engrg Contrs Havana Cuba
Torrance, Robert S CE '16 165 Buckingham Rd Yonkers N Y
Industria 100 Havana Cuba
Towl, Forrest M CE '86 MASCE MASME MAIME Shelter
[Island Hts N Y
Pres Southern Group Pipe Lines 26 Broadway N Y C
Towle, John W CE '94-----MOMTeeCl 3602 Pacific St
Pres Omaha Steel Works 348 Bee Bldg Omaha Neb
Townsend, David W CE '15-----Great Falls Mont
Engr State Highway Comm
Trask, Clarence H CE '12-----AMASCE R D 2 Fulton N Y
Constr Supt Dupont Engrg Co Wilmington Del
Tran, Frank G CE '22-----1714 Franklin St Waco Tex
Trautwine, John C 3d CE '00 MASCE Box 6509 Upper Darby
Civil Engr Philadelphia Pa [Branch
Trimpi, Allen L CE '10 AMASCE 279 Main St Chatham N J
Engineer and Contractor
Tripp, Harry J CE '08-----Dryden N Y
Res Engr C P R R Edmonton Alberta Canada
Troxell, Willard W CE '14-----3312 W North Ave Baltimore Md
Truesdell, Walter E CE '97-----MCSCE 29 Mountain Ave Sum-
Ind Engr 5 Beekman St N Y C [mit N J
Trumbull, William C CE '82-----11½ Gruff St Oil City Pa
Asst City Engineer
Truran, Ernest A CE '95-----33 Lincoln Terrace Yonkers N Y
Asst Engr in Cons Engrs Off S P C 165 Broadway N Y C
Tsai, Ping Y CE '11 AMASCE Chang Chow Kiang-Su China
Asst Engr Chuchow-Chinchow R R Peking China
Tuller, Jesse D CE '09-----65 Branch Ave Red Bank N J
Tuller Constr Co Engrg Contr
Tunnicliffe, John C CE '17-----R F D 369 Moline Ill
Mem Priestner Constr Co 1006 Kahle Bldg Davenport Ia
Turneaure, Frederick E CE '89 MASCE MAREA Madison Wis
Cons Engr Dean Coll of Meehs & Engrg Univ of Wis
Turner, Ebenezer T CE '83-----Box 434 Ithaca N Y
Vice-Pres First Natl Bank & Morse Chain Co
Turner, Horace G CE '92-----Rossie N Y
Turner, Myron W CE '11-----AMEIC Ft William Ont Can
Res Engr Ft William Paper Co Ltd
Turner, William J CE '07-----MAIME Lexington Va
Asst Gen Mgr Braden Copper Co Rancagua Chile S A
Turrill, Sherman M BA CE '01-----703 Fourth Ave Maywood Ill
Teaching c/o Board of Ed Chicago Ill
Tuttle, Sidney L CE '01-----Big Flatts N Y
Tuttle, Walter I CE '02-----32 Medway St Providence R I
Mfr Frank Mossberg Co Attleboro Mass
Twining, William CE '90-----411 Center St E Manch Chunk Pa
Engr M of W C R R Co of N J
Ullrich, Carl O CE '03 MASCE 475 Hamilton St Albany N Y
Asst Deputy Commr State Tax Comm Capitol Bldg
Underhill, Arthur CE '99-----MASLAreh Sound Beach Conn
Landscape Architect
Underhill, George G CE '06-----AMASCE 23 Western Ave
Mgr Fraser Brace & Co 83 Craig St W [Albany N Y
Montreal P Q Can
Underwood, Bert O CE '22-----1528 W 37th St Okla City Okla
Draftsman Boardman Co
Underwood, Howard W CE '01-----AMASCE Moglan Pa
Genl Mgr Field Barker and Underwood Philadelphia Pa
Underwood, Paul H CE '07-----MSPEE 960 E State St
Prof of Surveying School of Civil Engrg C U [Ithaca N Y
Unger, George F CE '10 AMASCE 31 Berkeley Place Buffalo
Asst Engr City Planning Comm 328 Prndential Bldg [N Y
Upjohn, Richard R CE '80 BD-----1676 69th St Brooklyn N Y
Priest
Urner, Jonas P CE '05-----Frederick Md
Scott & Hume Contrs Zaralo Buenos Aires Arg Rep S A
Urquhart, Leonard C CE '09 AMASCE 203 Wyckoff Ave Ithaca N Y
Asst Prof Str Engrg School of Civil Engrg C U [N Y
Utz, Charles P CE '04-----90 Richland St Rochester N Y
Vice-Pres Alexander Shumway & Utz Co 16 State St
Valderrama, Mannel A CE '18-----Brooklyn N Y
Mergenthaler Linotype Co 29 Ryerson St
Van Camp, Paul M CE '20-----Fine View N Y
c/o Methodist Missions Peking China
Van Campen, James K CE '17 308 N Clinton St Olean N Y
Van De Mark, Otis S CE '10-----4608 Caroline St Houston Tex
Vice-Pres Amer Constr Co 410 Gulf Bldg
Vanderbeek, Horace A CE '11 MCE '12 MSPEE Somerville
Prin Wusih Tech Sch Wusih Kiangsu China [N J
Vandevanter, Elliott CE '08-----AMASCE Leesburg Va
Capt Corps of Engrs U S A Ft Humphreys Va
Vanneman, Arthur V CE '09-----1257 Lincoln Ave Tyrone Pa
Pres & Genl Mgr Tyrone Lino & Stone Co
Vanneman, Charles R CE '03-----AMAREA 555 Providence St
Chief Engr N Y State Pub Ser Comm [Albany N Y
Van Pelt, William H CE '23-----80 Boyd St Stapleton N Y
c/o George F Hardy Cons Engr 309 Broadway N Y C
Van Sieten, Abram L CE '12-----Hollis N Y
Asst to Supt Texas Oil Co 17 Battery Place N Y C
Van Valkenburg, Paul I CE '20 9137 115th St Richmond Hill
c/o N Y Tel Co 15 Dey St New York City [N Y
Van Vliet, Paul D CE '10-----160 Forest Ave Oak Park Ill
Pub Mgr Univ Port Cem Co 53 W Jackson Blvd Chicago Ill
Vedder, Herman K CE '87-----E Lansing Mich
Prof Civil Engrg Mich Agr Coll
Vedder, Wellington R CE '91-----Catskill N Y
Vickers, Thomas Me CE '90 MCE '91-----200 S Clinton St
See & Treas Syracuse Dry Goods Co Syracuse N Y
Viertels, Ephraim BS CE '05-----776 Prospect Ave N Y C
Vieweg, Frederic CE '11-----Trona Calif
Asst Genl Mgr American Trona Corp
Vieweg, Otto C CE '16-----453 Cypress St Elmira N Y
Statistician Elmira Water Light & R R Co
Vincent, Everett M CE '15-----40 Park Place Goshen N Y
Reinf Cone Desur Chile Exploration Co 120 Bdwy N Y C
Vivoni, Armando CE '15-----San German P R
Asst Engr Isabela Irrig Serv Quebradillas P R
Vizeaino, José M CE '15-----Vives 247 Cardenas Cuba
Contracting Engineer
Vogelson, John A CE '00-----MASCE 8009 Crefeldt St
Chief Engr Bureau of Surveys City Hall [Philadelphia Pa
Volpe, Innocent J CE '22-----293 Camden St Newark N J
Volz, Charles A CE '11-----700 Cresecent Ave Buffalo N Y
Right of Way Engr Niagara Lockport & Ontario Power Co
Lafayette Bldg
Vong, Pao Ling MCE '22-----567 Burkhill Road Shanghai China
Vosburgh, Claude G CE '09-----33 Albion St Malden Mass
Vose, Walter I CE '92-----Manville R I
Merchant
Wadsworth, Joel E CE '90 MASCE MAREA MASTM MAI&SI
Div Engr Am Bridge Co 30 Church St N Y C
Waesche, George E AB CE '95 14 Summit St Glen Ridge N J
Cons Engr with Sanderson & Porter 52 William St N Y C
Wagner, George O CE '00 Astor Ct Apt Bdy & 90th St N Y C
Wait, Bertrand H CE '02 MASCE 62 Montgomery St Pough-
Dist Engr Port Cem Assoc 374 Madison [keepsie N Y
Ave N Y C
Wait, John C CE '82 MCE '91 LLB MASCE 1520 Jessup Ave
Atty at Law Woolworth Bldg N Y C [Highbridge N Y C
Wait, Owen A CE '98-----AMASCE
Edison Bnilding Los Angeles Calif
Wait, Robert S CE '13-----12 Mitchell St Norwich N Y
Engineer and Contractor 66 S Broad St
Walbran, Nicholas A CE '18-----Oriskany N Y
Draftsman The Bossert Corp 1408 Oneida St Utica N Y

- Waldo, Reginald CE '19-----Campbell Hall N Y
Project Engr Missouri State Highways Box 274 Eldon Mo
- Wales, William H Jr CE '12-----14 Porter St Oswego N Y
- Walker, Carl H CE '18-----Cathedral Apts Baltimore Md
Pres Walker Equipment & Supply Co
- Walker, Charles L CE '04-----AMASCE 201 Fairmont Ave
Prof San Engr School of Civil Engrg C U Ithaca N Y
- Wall, James J Jr CE '16-----
Repr Holt Mfg Co 262 Pearl St Buffalo N Y
- Wallace, Aaron V D CE '20-----JASCE Goshen N Y
Flat Iron Hotel Omaha Neb
- Wallhauser, George O CE '96-----602½ E State St Olean N Y
- Walzer, Isidore CE '09-----AMASCE 214 Elizabeth Ave
[Hempstead N Y]
- Seey & Treas Heling Contrg Corp Lindenhurst N Y
- Walzer, Samuel J CE '12 881A Lafayette Ave Brooklyn N Y
President Walzer Bros Corp 44 Court St
- Wang, Chieh-Yao MCE '19-----3 Tah-Sen Bridge Ningpo China
- Wang, Chien Hsien MCE '20-----Hsiopei Kwanshan St
Asst Engr Works Dept Chili River Comm Tientsin China
- Wang, Hsi C MCE '21 Ministry of Communications Peking
[China]
- Wang, Kuo Shu CE '23 33 Swen-ho St Chengtu Szechuan China
- Wang, Li Z CE '22-----Checheng Honon China
- Wang, Tsan CE MCE '12-----Tientsin China
- Wang, Tsen Shih MCE '22-----26 Sinza Road Shanghai China
- Wang, Woodson BS CE MCE '23 Meiway St Kashing China
- Wang, Yuen-Ling MCE '23 567 Burkhill Road Shanghai China
- Wang, Yu-Kwang MCE '23-----c/o Nanyang Middle School
[Shanghai China]
- Wannamaker, William W CE '21-----JASCE 20 Elliott St
[Orangeburg S C]
- Res Engr S C Hwy Dept Ridgeland S C
- Wauzer, Charles T CE '13 c/o Prof S G George Ithaca N Y
c/o Great Falls Power Co Great Falls S C
- Ward, Albert A CE '13-----32 South St Stamford Conn
Ward & Kurz Contractors & Builders Ithaca N Y
- Warner, Howard S BS CE '11 921 Crawford St Viaksburg
[Miss]
- Warner, Loring K CE '10-----336 E Church St Marion O
President Marion Sand & Gravel Co
- Warner, Monroe CE '88-----MCIES MOTA 1386 E 81st St
Mgr Warner Mfg Co 810 Citizens Bldg Cleveland Ohio
- Warriner, Thomas R CE '93-----MIAES 1011 Third Ave E
Cons Civil Engr Interstate Bldg [Cedar Rapids Ia]
- Warthorst, Frank W CE '74-----MAAAS R D No 2 Box 7
Retired Manufacturer [Bakersfield Calif]
- Watkins, Charles B CE '15-----1105 N Gilmore St Baltimore Md
Lt (jg) CEC U S N Naval Operating Base Norfolk Va
- Watson, Carl H CE '10-----AMASCE Great Neck N Y
Pres Gregory Coal & Lumber Co
- Watson, M Ross CE '12-----Danville Va
Seey-Treas Watson-Fitzgerald Co Inc Bldrs Sup
- Weatherlow, Hugh E CE '07-----132 W Fourth St Mt Vernon
Off Mgr of Constr Raymond Cone Pile Co [N Y]
140 Cedar St N Y C
- Weatherston, John CE '95 MD-----MAMA 734 Oakwood Blvd
Physician 30 N Michigan Blvd [Chicago Ill]
- Weaver, David W CE '13-----17 King St Jamaica N Y
205 Division St Oil City Pa
- Webb, James R CE '11-----20 Wright Pl Searsdale N Y
Estmg Engr Turner Constr Co 244 Madison Ave N Y C
- Webb, Seth W CE '06-----4146 E 106th St Cleveland O
Asst Engr Cleveland Union Terminals Co
- Webb, Walter L CE '84 MCE '89 MASCE MECIPH MAREA
Cons Engr 1211 Walnut St Philadelphia Pa
- Weber, Bernis B CE '04 MAAE 111 Cowell Ave Oil City Pa
City Engineer City Hall
- Weber, Charles M BS in CE CE '14 MCE '15-----JASCE
c/o Amer Express Co Paris France
- Weber, Richard CE '18-----Camillus N Y
Asst Engr Schenectady Rys Co Schenectady N Y
- Webster, Adrian K CE '14-----Vega Texas
Ranch & Oil Business
- Weed, Addison CE '79-----MNYSHorS North Rose N Y
Fruit Grower and Farmer
- Weidberg, Naphtah CE '19 MAAE 1483 Bryant Ave N Y C
- Weidman, J Hynds CE '03-----AMASCE Marcellus N Y
Engr and Contr 225 Walton St Syracuse N Y
- Weidner, Carl R CE '04-----AMASCE 306 W Main St Indepen-
Chief Engineer The Prairie Pipe Line Co [denca Kan]
- Weindling, Ludwig CE '18-----672 Macon St Brooklyn N Y
- Weiss, Bertrand CE '09-----360 Riverside Dr N Y C
Sec & Treas Berkshire Products Inc 18 W 34th St
- Weiss, Charles CE '13-----MAAE 247 Gregory Ave Passaic N J
Supervisor Pa R R Monongahela City Pa
- Weiss, Samuel CE '13-----Detroit Mich
Salesman Semet-Solvay Co 1705 Real Est Exch Bldg
- Welker, Philip A CE '78 MASCE 1801 16th St N W Wash-
Retired [ington D C]
- Welles, Theodore L Jr CE '13 AMASCE 2316 Grandview Ave
Constr Supt Crowell & Little Constr Co Cleveland O
- Wells, Edward H Jr CE '10-----475 E 29th St Brooklyn N Y
- Wells, Jesse W CE '10-----Setauket N Y
Surveyor
- Wells, Lawrence R CE '21-----Schnylerville N Y
Sales Mgr Orange Cotton Mills Orangeburg S C
- Welsh, Russell D CE '13-----AMASCE 4126 Forest Pk Ave
Res Engr William C Olsen Elizabeth City N C [Balto Md]
- Werner, Victor H AB '12 CE '14-----
Sales Engr Belmont Iron Works 15 Park Row N Y C
- West, Randolph C CE '20-----922 Gravier St New Orleans La
With Jas Stewart & Co Inc Houston Texas
- West, Ray B CE '06 MAAE MASAgRE 393 Blvd Logan Utah
Dean of Agr Engrg & Mech Arts Utah Agr Coll
- Whedbee, Edgar CE '10-----309 North St Portsmouth Va
Cons and City Engineer Bonham Tex
- Wheeler, Paul T CE '14-----Lackawanna N Y
Draftsman Amer Bridge Co Ambridge Pa
- Wheelock, Charles B CE '76-----209 Babcock St Brookline Mass
Ins 117 Water St Boston Mass
- Whelpley, James R CE '96-----Riverdale Md
- Whipple, John B CE '07 AMASCE 209 Willow Ave Ithaca NY
Res Engr United Illtg Co 1115 Broad St Bridgeport Conn
- Whiskeman, James P CE '98-----AMASCE 3343 Sedwick Ave
Cons Engr 153 E 40th St New York City
- Whitbeck, Arthur S CE '03-----MAAE 160 Rockingham St
Asst Engr Dept State Engr Triangle Bldg Rochester N Y
- White, Frank M CE '11-----AMASCE Brockport N Y
Dist Engr Cor Bar Co 1515 Gt Northern Bldg Chicago Ill
- White, John S CE '02-----103 Waban Ave Boston Mass
With Morse Chain Co of Ithaca N Y 141 Milk St
- White, Ralph L CE '11-----1130 Academy St Watertown N Y
Lumber Business & Contrg G W White & Son
- White, T Sidney CE '73-----MASCE MESWPa
c/o Penn Bridge Co Beaver Falls Pa
- White, Willard O CE '00 MASCE 150 Stockton Ave Union-
Chief Engr W J Rainey Inc Fayette Title [town Pa]
& Trust Bldg
- White, William A CE '12-----3901 Brookline Ave Baltimore Md
- Whitman, Ezra B CE '01 MASCE 139 W Lanvale St Balti-
Norton Bird & Whitman Munsey Bldg [more Md]
- Whitney, Andrew J 3d CE '18-----82 Linwood Ave Buffalo N Y
Rodman Classified Service Penn R R
- Whitney, Charles S CE '14 MCE '15 AMASCE 85 Pearl St
Hool Johnson & Whitney Cons Engrs [Bradford Pa]
- Whitney, Guy F CE '14-----New Hartford Conn
Sec Nashua Employers Assn 85 Main St Nashua N H
- Whitney, Howard E CE '22-----43 Terrace Ave Albany N Y
Asst Engr Susquehanna Power Co Conowingo Md
- Whitney, Leonard H M CE '08-----MAAE St Johnsville N Y
Asst Engr N Y State Hwy Comm
- Whitney, Stanley E CE '13-----616 E Water St Elmira N Y
Jnn Asst Engr N Y State Engr Dept
- Whitney, William N CE '14-----300 Field St Rochester N Y
- Whitson, Abraham U CE '99-----AMASCE 206 Franklin Pl
City Surveyor [Flushing N Y]
- Whittier, Paul F BS in CE CE '16-----MAAE Chattanooga Ga
Res Engr Lockwood Greene & Co of Boston Atlanta Ga
- Wieh, Bernard CE '10-----AMASCE 322 Linden Ave
[Brooklyn N Y]
- Wiek, Richard B CE '81-----125 N Vine St Warren O
Vice-Pres & Engr The Miller Constr Co
- Wieghardt, George F CE '09 MASCE MAWWA 1904 Cedar
Consulting Engineer [Rd Baltimore Md]
- Wight, Frank C CE '04 MASCE 32 Waldron Ave Summit N J
Managing Editor Engrg News-Record Hill Bldg N Y C
- Wigley, Chester G CE '07 MASCE MAWWA 66 Pierson Ave
Cons San Engr 2 E 23d St N Y C [Maplewood N J]
- Wigton, C Benson CE '09-----AMASCE 1353 Watchung Ave
Vice-Pres Levering & Garrigues Co [Plainfield N J]
552 W 23d St New York City
- Wileox, Clark L CE '01-----AMASCE 5300 Coral St
Treas The Pitt Construction Co Inc Pittsburgh Pa
- Wileox, Robert B CE '90-----MAAE Cosmos Club Washington
Civil Engr Constr Service War Dept [D C]
- Wilgus, Herbert S CE '01-----MASCE MAREA 8 N Church St
Cons Engr & Mgr of Coal Mines DuBois Pa
- Willeox, James DeWitt CE '07-----3820 Cliff Rd Birmingham
State Mgr Mutual Life Ins Co of N Y [Ala]
- Williams, Alan F CE '15 JASCE MAAE Neighbours Calif
Engrg Dept N W P R R P O Box 144 Sausalito Calif
- Williams, Chauncey G CE '87-----MASCE 216 E Sixth St Plain-
17 Herkimer St Hamilton Ont Can [field N J]

- Williams, Edwin C CE '07 1348 Euclid St N W Washington
Asst Accountant S O Co of N Y Shanghai China [D C
Williams, Enrique Ruiz CE '06-----AMASCE MCuSE
Civil Engr Estrada Palma entre Estrampes y J Delgado
Havana Cuba
- Williams, Friend P CE '99 MASCE 527 Mercer St Albany NY
Secretary N Y State Water Power Comm
- Williams, Gerald C CE '21-----c/o W D Holden Turin N Y
- Williams, Harold H CE '09--42 Herman St Glen Ridge N J
Sales Engr David Lupton's Sons Co 50 Church St N Y C
- Williams, Howard S CE '02-----1616 W 3d St Cleveland O
- Williams, J Stewart CE '08-----Tampico Tamaulipas Mex
Huesteca Petroleum Co
- Williams, Roger B Jr CE '01-----AMASCE Ithaca N Y
67 Wall St New York City
- Williams, Sylvester N CE '72 AM MAREA 734 Fair Oaks
Prof Emer of Civil & San Engrg [Ave Oak Park Ill
Cornell College Mt Vernon Ia
- Williams, Tudor R CE '03-----1322 Gibson St Scranton Pa
Secretary of Mine-Cave Comm
- Wilson, Calvin L BS CE '12-----MNACA 1222 Jennings Ave
Auditor Aeme Brick Co Ft Worth Tex
- Wilson, Edgar M CE '10--10 E Plumstead Ave Lansdowne Pa
Wilson & Beekershoff Optg Bldrs 60th & Oxford Sts Phila-
delphia Pa
- Wilson, George E CE '12--4004 Ga Ave N W Washington D C
Merchant Wall Paper & Paint Springfield Mo
- Wilson, Harry K CE '08 AMASCE 105 Chestnut St Montclair
1 Madison Ave T-146 New York City [N J
- Wilson, Percy S CE '19 MCE '20 JASCE 28 Woodland Ave
Asst Engr with J H Fuertes W W Ext [Glen Ridge N J
Harrisburg Pa
- Wilson, W Edward CE '01-----Seattle Wash
Consulting Engineer 3223 33d Ave S
- Windsor, Philip B CE '00--MASCE c/o The Guaranty Trust
[Co Paris France
- Wing, Charles B CE '86--MASCE MASTM 345 Lincoln Ave
Prof of Str Engrg Stanford Univ Palo Alto Calif
- Wing, Frederick K CE '90 AMASCE MECIBu 592 Ferry St
Pres & Chf Engr F K Wing Co 1314 Prudential Bldg
Buffalo N Y
- Winship, Arthur W CE '19--80 Broad St Plattsburg N Y
Woodlands Assistant 27 Clinton St
- Winship, Lef CE '05--AMASCE MAAE 145 N Poplar St
Div Engr Mo Pac R R Wichita Kans
- Wistrich, Harry CE '18-----1106 Union Ave N Y C
Bridge Dept L V R R Bethlehem Pa
- Wittwer, Norman C CE '21--40 Chestnut St Haddonfield N J
Engr Remington & Vosbury Cons Engrs Camden N J
- Wixom, Clinton W CE '22-----Trumansburg N Y
Draftsman Amer Bridge Co Pencoyd Pa
- Wocher, Reginald F CE '22 782 Warburton Ave Yonkers N Y
- Wolfe, Frank C CE '95-----MASCE 2915 Pa Ave
Chief Engr McLean Contr Co Fidelity Bldg Baltimore Md
- Wollenweber, Gay CE '11--Twickenham Terrace Route A
Secy & Treas Beasley Contracting Co Savannah Ga
- Wong, Harold E CE '17--Kailan Mining Administration
With Dr C C Wong Chinese Eastern [Tientsin China
Rwy Manchuria
- Wong, Yik S CE '11--5 Race Course Rd Tientsin China
- Woo, Choong W MCE '21--Saunkwei Fong Changeow City
[Kiangsu China
- Wood, Alfred R CE '21-----Princes Bay N Y
- Wood, Bertram L CE '11-----115 Reid Ave Brooklyn N Y
- Wood, Edward A CE '08--AMASCE 3700 Maplewood Ave
City Plan Engineer Dallas Texas
- Wood, Nelson T CE '16--429 E Third St Brooklyn N Y
520 E 20th St New York City
- Wood, Rollin D CE '06-----338 W Decatur St Decatur Ill
Vice-Pres & Genl Mgr Miss Valley Str Steel Co St Louis Mo
- Woodbury, Bicknell J CE '19-----Tulsa Okla
Mgr Natl Adv Dept Tulsa Daily World
- Woodruff, Charles C Jr CE '20--JASCE Forest Hills N Y
Asst to Genl Supt C C Woodruff & Co
- Woodruff, Glen B CE '10 AMASCE 216 N Geneva St Ithaca
[N Y
- Woodward, Harold S CE '22 MCE '23 Chamberlain Pkwy Wor-
Asst Engr Atlantic Fruit Co Cayo Mambi [cester Mass
Oriente Cuba
- Works, Norris M CE '97 MAAE 748 Cramer St Milwaukee
1st Asst Supt 12th Lighthouse Dist 424 Federal Bldg [Wis
Wright, Chilton A CE '19 MCE '20-----JASCE
[10 Woodbine Ave New Rochelle N Y
Asst Hydr Engr H L Doherty Co 60 Wall St N Y C
- Wright, Ehrich H CE '21--6f E 86th St New York City
- Wright, George C CE '03 MAAE 1609 Culver Rd Rochester
County Supt of Hwys Monroe Co Court House [N Y
- Wright, Harold B CE '14-----7 Jewett Place Utica N Y
Engr Bur of Public Roads Omaha Nebr
- Wright, Howard B CE '15--412 Glenwood Ave Syracuse N Y
Asst Estimating Engr Semet Solvay Co
- Wright, Thomas T BA CE '07-----Warsaw Va
Mgr Warsaw Off Henrico Lumber Co
- Wyckoff, Maurice M CE '12 AMASCE 246 Rochester Ave
Engrg Contr 56 W 45th St N Y C [Brooklyn N Y
- Wyckoff, Norman R CE '21-----MDES 1486 Webb Ave
Draftsman Detroit Water Board Detroit Mich
- Wyckoff, Ralph F CE '08-----Los Angeles Calif
Rooney-Wyckoff Co Paving Contrs 607 S Hill St
- Yeh, Chia T MCE '20--113 Kiangse Rd Shanghai China
- Yen, Hooing-Kwie MCE '19--East St Han-Shan Shien Anhui
[China
- Yew, Ing Choan BSCE MCE '23--73 Tai Pu Sze St Peking
[China
- Yewell, J Edward CE '12 MAREA 140 Clinton St Greenville
Chief Draftsman B & L E R R [Pa
- Young, John L CE '22-----Union S C
- Young, Nathan E CE '01-----123 W Main St Union N Y
Highway Contractor
- Yzaguirre, Salvador M CE '10--MCuSE Camaguey Cuba
Civil Engineer Central Moron
- Zabat, Mannel V CE '21-----Gapan N Eijja Philippines
Jun Asst Engr N Y State Hwy Dept Poughkeepsie N Y
- Zabel, Oscar E F CE '15--MAAE, MRoSE Ridge Rd
Asst Engr Engrg Dept Eastman Kodak [Charlotte Sta
Co Rochester N Y
- Zabel, William J CE '14--MRoES 118 Clifford Ave
Asst Engr N Y State Barge Canal Off Rochester N Y
- Zagoren, Louis I CE '14-----Graham Beach N Y
Wyckoff Engrg Corp 56 W 45th St N Y C
- Zambrana, José A CE '15-----Juana Diaz P R
c/o Municipio San Juan P R
- Zander, Roy J CE '17--2014 Sheffield Ave Chicago Ill
Zander-Reum Co 750 Dearborn St
- Zarbell, Elmer CE '95 MASCE 2089 Sherwood Ave Louisville
Off Chf Engr L & N R R Co [Ky
- Zee, Nai-Zung MCE '19--MSSCh MESCh JASCE 331 Peking
Prof Hydr Engrg Conservancy Engrg [Rd Shanghai China
Coll Nanking China
- Zieget, Julius CE '10--2 E Lexington St Baltimore Md
- Zolzer, Charles H CE '01--9 Whitter St E Orange N J
Engr and Sales Mgr Electro-Chem Sup & Eng Co
Philadelphia Pa

THE GEOGRAPHICAL LIST

The geographical list, first compiled by the late Profes-
sor Charles L. Crandall in 1905 and published in the Trans-
actions of the Association of Civil Engineers for that year,
was continued each year until 1918 when it was decided
that the additional expense involved was not justified. A
geographical index, however, has been maintained by Pro-
fessor Barnes, who succeeded Professor Crandall as Corre-
sponding Secretary of the Association; and from this were

secured the data for the interesting ent which appears on
the front cover of this issue.

The index is based on the latest information obtainable
in regard to the business addresses of our graduates and
is kept up to date in Director Barnes' office. He will be
glad to supply the names of Cornell Civil Engineers in any
given locality to anyone needing them, thus making avail-
able the information formerly furnished by the publication
of the geographical list.

FUERTES GOLD MEDALISTS

UNDERGRADUATES

Albert Lloyd Colsten	1895
William Mackintosh	1896
Gilbert Powers Ritter	1897
Harley Stuart Gibbs	1898
George Wilfred Penfield	1900
George Emil John Pistor	1901
Albert Hotchkiss Chandler	1902
Justin Wyman Lindlow	1903
Ress Milton Riegel	1904
John Earl Elliott	1905
Charles Ferguson Cook	1906
Ford Kurtz	1907
Bruno Charles Leehler	1908
George Frederick Weighardt	1909
Lionel Montefiore Levine	1910
John Raymund Hoffert	1911
Edwin Samuel Healy	1912
Roger Williams Parkhurst	1913
Louis Isaac Zagoren	1914
Herbert Ridgeway	1915
Theodore Chittenden Rogers	1916
Samuel John Leonard	1917
Morris Hilton Barnes	1918
John Charles Gebhard	1919
Joseph Howard Christian	1920
Laurence Raymond Wells	1921
Frank Ellsworth Conkling, Jr.	1922
Burton Aleott Scott	1923

GRADUATES

John Filmore Hayford	1895
Certain Field Methods Used on the Survey on the Mexican Boundary in 1892-93.	
Elon Huntington Hooker	1896
Storage Capacity in Lakes and Reservoirs.	
Erasmus Darwin Presten	1897
The Transcontinental Arc from Cape May to San Francisco.	
John Cassan Wait	1898
Engineering and Architectural Jurisprudence.	
Frederick Eugene Turneure	1899
Moving Trainload Experiments.	
Clinton Brown Stewart	1900
Gauging of the Niagara River.	
Edward Charles Murphy	1901
The Windmill, Its Efficiency and Economical Use.	
Henry Robertsen Lordly	1902
Anti-Friction Bearings.	
William Kendrick Hatt	1903
Tests of Reinforced Concrete Beams.	
Anson Marston	1904
Sewage Disposal in Iowa.	
Willard Beahan	1905
Field Practice of Railroad Location.	
Erwin Ernest Haslam	1906
The Importance of Ice Disposal on Large Hydraulic Power Development.	
James Hillhouse Fuertes	1907
Waste of Water in New York and Its Reduction by Meters and Inspection.	
John Clayton Hoyt	1908
Comparison between Rainfall and Runoff in North-eastern United States.	

William Martin Torrance	1909
Special Concrete Structures of the Hudson River Terminal.	
Richard Collier St. John	1910
Supplementary Report on Transportation Subways, No. 1 Location Design, Capacity, Operation, Bureau of Eng. of the Dep't of Public Works, City of Chicago, Ill.	
William Law Bowman	1911
Partnership Agreements for Civil Engineers.	
Daniel Webster Mead	1912
The Flow of Streams and the Factors that Modify It, with Special Reference to Wisconsin Conditions.	
Harry Thomas Cory	1913
Irrigation and River Control in the Colorado River Delta.	
Weston Earle Fuller	1914
Flood Flows.	
John Charles Lounsbury Fish	1915
Engineering Economics.	
Clement Edwards Chase	1916
The Cherry Street Bridge, Toledo, Ohio.	
Frederick William Scheidenhelm	1917
The Reconstruction of the Stony River Dam.	
Ross Milton Riegel	1918
The Hydraulic Jump as a Means of Dissipating Energy.	
George Paaswell	1919
Retaining Walls, their Design and Construction.	
Thomson Eason Mao	1920
Secondary Stresses in Framed Structures.	
Wilson G. Harger	1922
Location, Grading and Drainage of Highways.	
Lynn Crandall	1923
Use of Water on the Irrigation Project of the Twin Falls North Side Land and Water Company.	

The Fuertes gold medals are of a value of fifty dollars each, and are awarded under the following conditions:

The undergraduate medal "will be awarded annually to that student of the School of Civil Engineering who may be found at the end of the first term of his senior year to have maintained the highest degree of scholarship in the subjects of his course; provided he has been in attendance in the University for at least one and one-half years".

The graduate medal "will be awarded annually to that graduate of the School of Civil Engineering who may write a meritorious paper upon some engineering subject tending to advance the scientific or practical interest of the Profession of the Civil Engineer".

The paper will be presented on or before April 15. If a paper is presented in printed form, it will be received only provided it has not been published earlier than the preceding April 15.

THE FUERTES MEMORIAL CONTEST IN PUBLIC SPEAKING

Through the generosity of Mr. Charles H. Baker, a graduate of the College of Civil Engineering of the class of 1886, a fund has been created, the income of which is to be used to offer prizes in public speaking for students in the Colleges of Engineering and Architecture. The first prize is \$125, the second \$35 and the third \$20.

Winners of First Prize

R. E. Pierce, M.E.	1913	C. Ku, M.E.	1918
H. B. Pope, C.E.	1914	No award in	1919
A. M. Beebe, M.E.	1915	W. D. Ellis, M.E.	1920
H. L. Hock, C.E.	1916	L. R. Chapman, B.Ar.	1921
L. V. Lacy, B.Ar.	1917	I. L. Scott, B.Ar.	1922
		A. W. Crouch, C.E.	1923

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SCHOOL NOTES

C. E. STUDENT CHAPTER ELECTIONS

The annual elections of the Cornell Student Chapter of the American Society of Civil Engineers were held in Sibley basement at eight o'clock in the evening of May 8.

The main business of the evening was started with little delay. Due to the negligence of members in not petitioning for nominations, considerable digression was made from the ordinary procedure. Nominations have heretofore been made by petitions of ten names each, in accordance with the general usage of other university organizations. Since no petitions were made this year, it was necessary to nominate the candidates directly from the floor.

Elections were made as follows:

President	R. T. Sprague '24
Vice-President	H. G. Veeder '25
Secretary	H. A. Falconer '24
Treasurer ex-officio	P. F. Beaver '24
(Business Manager of the Cornell Civil Engineer)	
Athletic Director	M. C. Newton '24
Faculty Athletic Adviser.....	Prof. H. H. Seofield

After the elections, Professor Barnes gave a short talk on the aims and achievements of the School of Civil Engineering after which he presented shingles for athletics and for the Fuertes Prize Competition.

Professor Ogden spoke on the work of graduate students. Three of the graduates gave brief accounts of the results of their research work; F. E. Conkling talked on riveted plates; T. C. Adams on hydraulic experiments and N. A. Eager on highways. The more serious parts of the meeting were interspersed by music and other entertainment. After the program of the evening had been carried out, the meeting was adjourned for refreshments and informal discussion.

THE SUMMER CAMP

The summer survey for sophomore C. E.'s and Foresters will be held as usual on Lake Cayuga. This year the camp will be at Farley's, two miles south of Union Springs, on the east side of the lake. It is interesting to note that, in their progress northward along the lake shore, the engineers are nearing the site of the original C. E. camp. In 1874, the first camp was held at Cayuga, north of Union Springs. In 1924, just fifty years later, this place will again be surveyed by Cornell Civil Engineers.

In a recent meeting, camp officers were elected as follows: Chief Engineer, D. G. O'Shea; Assistant Chief, C. G. Eaton; Quartermaster, M. Ripley and Commissary, H. G. Veeder, all of the class of '25. The arduous task of Assistant Quartermaster was voted by acclamation to K. K. Hoyt '25.

Professor Underwood intends to lose no time getting the men into the field. Camp starts June 11, which is immediately after the finals. Students should be addressed "Union Springs, N. Y." Camp ends on July 14. The sophomores are now looking forward to five weeks of hard work and all around good times.

FACULTY NOTE

Dr. E. W. Schoder, Professor of Hydraulics, has recently been appointed a member of a special committee of the A. S. C. E. for the investigation of Hydraulics Phenomena.

PHI KAPPA PHI

N. A. Eager and C. Y. Liang, Graduate Students, and J. H. C. Martens, Instructor of Geology, all graduates of the School of Civil Engineering, have been recently elected to Phi Kappa Phi.

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BRINGING MORE DAYLIGHT INTO INDUSTRIAL BUILDINGS.

Dr. George M. Price, writing on "The Importance of Light in Factories," in "The Modern Factory," states: "Light is an essential working condition in all industrial establishments, and is also of paramount influence in the preservation of the health of the workers. There is no condition within industrial establishments to which so little attention is given as proper lighting and illumination. Especially is this the case in many of the factories in the United States. A prominent investigator, who had extensive opportunities to make observations of industrial establishments in Europe as well as in America, states: 'I have seen so many mills and other works miserably lighted, that bad light is the most conspicuous and general defect of American factory premises.'"

"My own investigations for the New York State Factory Commission support this view. In these investigations it was found that 36.7% of the laundries inspected, 49.2% of the candy factories, 48.4% of the printing places, 50% of the chemical establishments, were inadequately lighted. There was hardly a trade investigated without finding a large number of inadequately lighted establishments."

Inadequate and defective lighting of industrial buildings is not confined to the establishments in New York State alone. The same conditions prevail in most sections of the country.

Such conditions as mentioned above are entirely opposed to the laws of health, sanitation and efficiency. Wherever poor lighting conditions prevail, there must be a corresponding loss of efficiency and output both in quality and in quantity. American industry is not using nearly enough daylight and sunlight in its buildings. Every endeavor should be made to use as much as possible of daylight for lighting purposes. To obtain this it is of course necessary that the rays of daylight and sunlight are permitted to enter the interior of the buildings as freely as possible, with the important modification that the direct rays of the sun must be properly diffused to prevent glare and eyestrain. A glass especially made for this purpose is known as Factrolite, and is recommended for the windows of industrial plants. Windows should be kept clean if the maximum amount of daylight is to pass through the glass, but the effort will be well repaid by the benefits secured.

In the presence of poor lighting, we cannot expect men to work with the same enthusiasm as when a well lighted working place has been provided. The physical surroundings have a deep effect upon the sentiments of the employees, and where bad working conditions are allowed to prevail, there is invariably a lessening of morale and satisfaction created thereby. Neglecting to utilize what nature has so bounteously provided, daylight, and which is so essential toward industrial efficiency, we have an instance of wastefulness, but now that the importance of good lighting is becoming recognized, undoubtedly more attention will be given by progressive industrial employers to furnishing the means which are essential for their workers to secure and maintain the efficiency, which counts for so much in the success of any industrial concern in this competitive age.

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C. E. HONOR COMMITTEE

After recent elections, the C. E. Honor Committee stands as follows for the year 1923-24, except that two members from the class of 1926 will be elected in the fall:

J. H. Ludlow '24, Chairman

P. F. Beaver '24

C. M. MacWilliam '24

H. W. Neseh '24

J. E. Duffy '25

H. G. Veeder '25

C. P. Wright '25

ROD AND BOB

C. L. Felske '24, D. D. Ehrhart '25, D. C. Kline '25, H. L. Simmons jr '25, G. F. West '25.

PYRAMID

S. E. Siseo '23, E. J. Derham '25, A. A. Denhard '25, E. B. Dennis '25, E. A. Proctor '25, C. W. Smith '25, W. R. Thompson '25, H. G. Veeder '25, H. H. Williams '25, H. M. Zaug '25.

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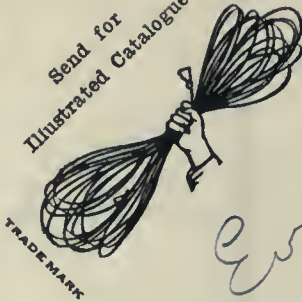
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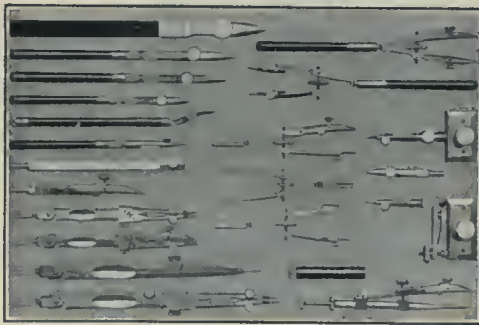


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